

**The Ramakrishna Mission
Institute of Culture Library**

**Presented by
Dr. Baridbaran Mukerji**

RMICL - 8

19642

CHAMBERS'S
ENCYCLOPÆDIA

A DICTIONARY
OF
UNIVERSAL KNOWLEDGE

NEW EDITION

VOL. I

A TO BEAUFORT



WILLIAM & ROBERT CHAMBERS
LONDON AND EDINBURGH

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

1888₁

All Rights reserved

RMIC LIBRARY	
Acc. No.	19642
Class.	332
Subj.	
Author	
Editor	
Publ.	
Check	✓
Bk. No.	✓
Checked	agm

The following Articles in this Volume are Copyrighted, 1888, by J. B. LIPPINCOTT COMPANY,
in the United States of America :

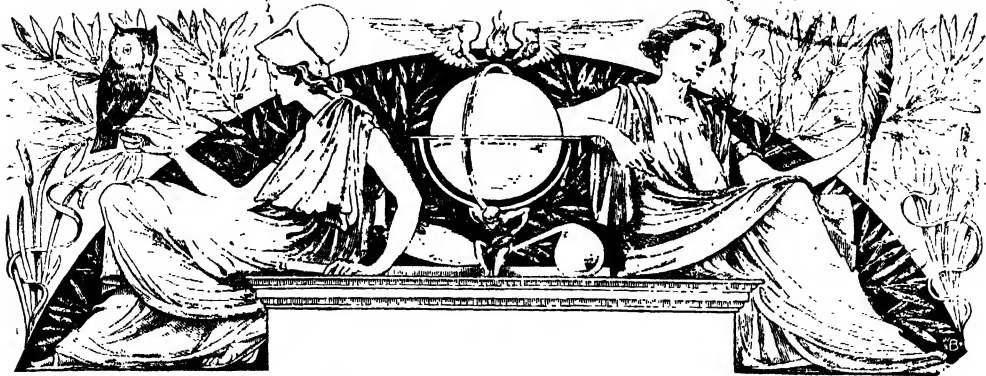
ADAMS, JOHN.	APPALACHIANS.
ADAMS, JOHN QUINCY.	ARGENTINE REPUBLIC.
AGASSIZ.	ARIZONA.
ALABAMA.	ARKANSAS.
ALASKA.	ARNOLD, BENEDICT.
ALBANY.	ATHENS.
ALEUTIAN ISLANDS.	ATLANTA.
AMAZON.	AUDUBON, J. J.
AMERICA.	BALTIMORE.
AMERICAN INDIANS.	BANCROFT, GEORGE.
ANDES.	BASE BALL.
ANDRE, JOHN.	

Among the more important articles in this Volume are the following:

A.....	CROON ISAAC TAYLOR.	ARKANSAS.....	CHARLES W. GREENE, M.D.
ABERDEEN.....	W. ALEXANDER, LL.D.	ARMENIA.....	CHARLES NISBET.
ADAM AND EVE.....	THOMAS DAVIDSON.	ARMOUR.....	JOSEPH ANDERSON, LL.D.
ADAMS, JOHN.....	WILLIAM JACOBS.	ARMY, and other	
ADAMS, JOHN QUINCY.....	J. THOMAS, M.D., LL.D.	Military articles.....	Major DUNLOP, F.R.A.
ADDISON.....	W. J. COURTHOPE.	ARREST, and other	
ADULTERATION.....	J. FAULCONER KING, F.C.S.	Law articles.....	THOMAS RALLIGH.
ADVERTISING.....	ROBERT COCHRANE.	ARI.....	Professor W. M. CONWAY.
ÆSCHYLUS.....	Professor J. MAHAFFY.	ARTERY.....	DAVID HEBBURN, M.D.
AFGHANISTAN.....	E. DELMAR MORGAN.	ARTHUR.....	Rev. S. BARING-GOULD.
AFRICA.....	Professor A. H. KEANE.	ARTICLES, THE THIRTY-	
AGNOSTICISM.....	Rev. JOHN McLELLAN.	NINE.....	Rev. J. G. CAZENOVE, D.D.
AGRICULTURE.....	Professor WALLACE.	ARTIFICIAL LIMBS.....	A. W. HALL, M.B.
ALABAMA.....	WILLIAM S. WAUGH.	ASCIDIANS.....	J. ARTHUR THOMSON.
ALASKA.....	CHARLES W. GREENE, M.D.	ASIA.....	Prince PETIT KROPOTKINE.
ALBERT NYANZA.....	R. W. FELKIN, M.D., F.R.S.E.	ASSAYING.....	EDWARD HOGG, Royal Mint.
ALCOHOLISM.....	GEORGE GIBSON, M.D.	ASSOCIATION OF IDEAS.....	Professor BAIN.
ALGÆ, and other		ASSYRIA.....	W. ST CHAD BOSCAWEN.
Botanical articles....	PATRICK GEDDES, F.R.S.E.	ASTROLOGY.....	Rev. EDWARD B. KIRK.
ALKALOIDS, and other		ASTRONOMY.....	Rev. EDWARD B. KIRK.
Chemical articles....	W. INGLIS CLARK, D.Sc.	ATHENS.....	MARTIN L. DODGE, American Archæological School, Athens.
ALPHABET.....	CROON ISAAC TAYLOR.	ATHLETICS.....	H. S. SKIPTON.
ALPINE CLUB.....	CLINTON DENT.	ATLANTIC OCEAN.....	JOHN MURRAY, LL.D.
ALPS, and other		ATMOSPHERE.....	ALEX. BUCHAN, LL.D.
Geological articles....	Professor JAMES GIBBIE.	ATOM.....	Professor TAIT.
ALLOTROPY.....	LEONARD DOBBIN, Ph.D.	ATOMIC THEORY.....	LEONARD DOBBIN, Ph.D.
AMAZON.....	H. C. WAUGH.	ATONEMENT.....	{ Rev. W. PULSTORD, D.D. THOMAS DAVIDSON.
AMERICA.....	CHARLES W. GREENE, M.D.	AUTUBON.....	CHARLES MORRIS.
AMERICAN INDIANS.....	CHARLES W. GREENE, M.D.	AURORA.....	ALEXANDER BUCHAN, LL.D.
AMERICANISMS.....	GRANT ALLEN.	AUSTRALIA.....	J. O'HALLORAN, Secretary of the Royal Colonial Institute.
AMERICA.....	J. ARTHUR THOMSON.	AUSTRIA.....	W. DUNDAS WALKER.
ANÆSTHESIA.....	ARTHUR W. HALL, M.B.	BABYLONIA.....	W. ST CHAD BOSCAWEN.
ANÆCHISM.....	THOMAS KIRKPUP.	BACH.....	J. FULLER MAITLAND.
ANCHOR.....	DAVID POLLOCK.	BACON.....	SIDNEY L. LEE.
ANALYSIS.....	W. I. CLARK, D.Sc.	BACTERIA.....	J. ARTHUR THOMSON.
ANALYSIS, ORGANIC.....	LEONARD DOBBIN, Ph.D.	BAGEHOT.....	THOMAS KIRKPUP.
ANDERSON.....	CHARLES W. GREENE, M.D.	BALLAD.....	THOMAS DAVIDSON.
ANDRÉ.....	Prof. JOHN P. LAMBERTON.	BALLET.....	R. W. LOWE.
ANGLING.....	W. SENIOR ('Red-spinner') Angling Editor of <i>The Field</i> .	BALLOON.....	ALEXANDER GALLETT.
ANIMISM.....	THOMAS DAVIDSON.	BALLOF.....	THOMAS KIRKPUP.
ANNUITY.....	JAMES SORLEY, C.A.	BALTIMORE.....	CHARLES W. GREENE, M.D.
ANT.....	J. ARTHUR THOMSON.	BAZAR.....	WALTER WHYTE.
ANTARCTIC OCEAN.....	JOHN MURRAY, LL.D., of the <i> Challenger</i> .	BANCROFT.....	A. K. MCCURRY, LL.D.
ANTHRAX, and other		BANDAGES.....	A. W. HALL, M.B.
Medical articles.....	R. A. LUNDIE, M.B.	BANKING.....	Revised by A. W. KIRK.
ANTHROPOLOGY.....	GRANT ALLEN.	BANKRUPTCY, and	
APHASIA.....	GEORGE GIBSON, M.D.	other Law articles....	WILLIAM C. SMITH.
APPALACHIANS.....	Prof. JOHN P. LAMBERTON.	BAPTISTS.....	Rev. J. McLELLAN.
APPARITIONS.....	Rev. S. BARING-GOULD.	BARON, BARONET, and	GEORGE BUENET, LL.D.,
AQUATIC ANIMALS.....	PATRICK GEDDES, F.R.S.E.	articles in Heraldry..	Lyon King of Arms.
AQUATIC PLANTS.....	PATRICK GEDDES.	BARK, EAST.....	PATRICK GEDDES.
AQUINAS.....	T. G. FAY.	BARROW.....	JOSEPH ANDERSON, LL.D.
ARABIA, ARABIAN		BASE-BALL.....	HENRY CHADWICK.
LITERATURE.....	Rev. JOHN MILNE.	BASQUES.....	THOMAS DAVIDSON.
ARBORICULTURE.....	HENRY GREENE, M.D., LL.D.	BAT.....	J. ARTHUR THOMSON.
ARCHÆOLOGY.....	JOSEPH ANDERSON, LL.D.	BATH.....	T. HEDDINGSTONE WILSON, M.D.
ARCHERY.....	J. BALFOUR PAUL.	BAXTER.....	Rev. JAMES INGLIS.
ARCTIC OCEAN.....	JOHN MURRAY, LL.D.	BAYeux TAPESTRY.....	J. R. FAIRMAN.
ARGENTINE REPUBLIC.....	SEÑOR DON V. G. QUESADA, Minister Plenipotentiary to the U.S.	BEACON.....	Messrs D. & T. STEVENSON.
ARISTOPHANES.....	Rev. H. A. HOLDEN, LL.D.	BEACONSFIELD.....	FRANCIS HENDES GROOME.
ARISTOTLE.....	DAVID RICHIE.	BEAST FABLES.....	THOMAS DAVIDSON.
ARIZONA.....	Rev. N. RAWLEDGE.		

MAPS FOR VOL. I.

	PAGE
AFRICA.....	
POLITICAL.....	80
PHYSICAL.....	81
AMERICA, NORTH.....	
POLITICAL.....	216
PHYSICAL.....	217
AMERICA, SOUTH	
POLITICAL.....	224
PHYSICAL.....	225
ASIA.....	
POLITICAL.....	488
PHYSICAL.....	489
ATLANTIC OCEAN	
PHYSICAL.....	511
AUSTRALIA.....	
POLITICAL.....	588
PHYSICAL.....	589
AUSTRO-HUNGARY	
POLITICAL.....	596



CHAMBERS'S ENCYCLOPÆDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE



is the first letter in our alphabet, and the corresponding symbol also stands first in many other alphabets derived from the Phœnician: the chief exceptions being the Ethiopic, in which it occupies the thirteenth place; the Runic, in which it has been lost and replaced by

a sign obtained from E; and the numerous alphabets of India and the Trans-Gangetic peninsula, which have been rearranged on phonological principles.

The form of the letter has undergone curious transmutations in the various alphabets into which it has passed during its long history. It originated, as De Rougé has shown, at least 6000 years ago in the hieroglyphic picture of an eagle, called *ahom* in the old Egyptian language, which was used to express the neutral vowel-sound. In the cursive hieratic form, which preserved hardly any resemblance to the picture of the eagle, the sign was borrowed by the Phœnicians, and was renamed by them, *aleph*, the 'ox,' from a fancied resemblance to the head and horns of that animal. That the Greeks at some very early period, probably not long after the time of Solomon, learned the art of writing from Phœnician traders, is proved by the fact that they denoted this letter by a name meaningless in their own language—*alpha*, which has been handed down to us in the word alphabet. Our own capital A is practically identical with the Greek and Roman lapidary form, and has preserved more closely than other alphabets the primitive Phœnician outline which is found in inscriptions of the 9th century B.C. In the square Hebrew the letter *aleph* retains the three strokes of our A, but in different positions; while in the Arabic and Syriac letter *alif* only one stroke has been preserved. (These forms are shown in the tables given at the article ALPHABET.) The Roman cursive form has lost only the cross bar. In the Greek and Latin uncial A became *a*, which

was the parent form of our own Italic and script *a*, and of the Greek minuscule *α*; while in the Caroline minuscule (used chiefly for books), in order to avoid confusion with *d*, the head of the letter was bent round, giving the form *a*, which, being copied from the best manuscripts by the early printers at Rome, has survived in the so-called 'Roman' type now ordinarily used in our printed books. We thus use three forms of the letter of very different dates—the Capital, the Italic, and the Roman. We also use a fourth form, the black-letter *a*, which arose in the north of Europe out of the Caroline *a*, the curved top being further bent round so as to form a second complete loop. On the other hand, in the Irish semi-uncial the loop of *a* was opened out at the top, giving the form *u*, which finally developed into the German capital *U*.

The sound represented by this symbol has varied almost as much as its form. In the Phœnician, Hebrew, Arabic, and other Semitic alphabets, it did not denote a vowel, but a faint guttural breath, such as is heard after the words *No!* or *Back!* pronounced abruptly, or between the first two vowels of *carta*. The Greeks, not requiring a symbol for this sound, and needing signs for the vowels which are not written in the Semitic languages, made use of the Phœnician letter to express the primary vowel-sound, the *a* in father. This is called the Italian or continental *a*, and is the sound which the letter usually has in Greek, Latin, and all the modern European languages except English, in which it is comparatively rare. It is the purest and fullest vowel-sound, and is produced by the whole air-passage being kept as open as possible, instead of being more or less contracted, as in the case of the other vowels, by the tongue or the lips. Many eminent philologists believe that in primitive speech it was the only vowel sound—all the rest having been obtained from it. This, of course, is only a speculation; but at all events it can be shown historically that there are words in which this sound has passed into those of the other

vowels, by one of two channels, either by *a* passing into *e*, and *e* into *i*; or, on the other hand, by *a* passing into *o*, and *o* into *u*. The primitive nature of this sound is also indicated by its predominance in the oldest languages, and by the fact that it is the vowel which a child learns first and most easily to pronounce, as is shown by its occurrence in so many 'nursery words,' such as ta-ta, dada, ~~ana~~, papa, mamma. In the speech of our Anglo-Saxon forefathers, *a* had two sounds—the long *a* in father, and the short *a* in man. The first is now usually replaced by *o* + *e*, *oe*, *ou*, or *au*, as in stone, toe, hour, and ought, which in Anglo-Saxon were written *stæn*, *to*, *hær*, *ahle*. The short *a* is sometimes retained, as in cat; or is replaced by *o*, *a* + *e*, or *o* + *e*, as in the words comb, ape, bone.

In modern English, the letter *a* has six distinct sounds. Of these, the continental *a* in father is the least usual in the speech of educated persons, but has been more frequently preserved in some northern dialects. The short *a*, in which the tongue is thrust forward instead of being kept back as far as possible, is the most common, as in the words man, hat, wag, hand, dagger. The name-sound *ae*, which is the Italian *e*, is usually denoted by the help of a postscript *e*, as in the words make, pane, fate, tale, ale. In fare and ware the same notation expresses the diphthong, which is denoted by *ai* or *ea* in fair and swear. The diphthongal sound *au* is sometimes denoted by a reduplication of the following consonant, as in the words all, tall. Lastly (as in the words among, about, final), *a*, like all the other vowels, occasionally drops into the neutral or fundamental vowel, the sound which slips most easily out of the mouth without conscious effort, and has thus at last reverted to the original sound of the Egyptian hieroglyph of the eagle, from which it started in the long history of some sixty centuries through which it has now been traced. See also ARTICLES ALPHABET, LETTERS, VOICE.

A, as a note in Music, is the major sixth of the scale of C. See MUSIC, SCALE. For A Major and A Minor, see also KEY. For A in ABBREVIATIONS, see under that head; and see DOMINICAL LETTERS. A1 is a symbol by which first-class vessels are classed in Lloyd's Register of British and Foreign Shipping. See LLOYD'S.

Aa, the name of a number of European rivers; the word being akin to the Old High German *aha*, 'water.' Thus, there are three streams called Aa in Westphalia, one in Switzerland, and one in North France. They are all small.

Aachen. See AIX.

Aalborg (Eel-town), a seaport in the north of Jutland, on the south side of the Limfjord. It is the seat of a bishopric, and has a considerable trade, exporting spirits, hides, cattle, butter, eggs, and chalk. Pop. (1880) 14,152.

Aalen, a town in the east of Württemberg, on the Kocher, 46 miles E. of Stuttgart. It has manufactures of wool and silk, dye-works, and iron-works. Pop. (1885) 6805.

Aalesund, a Norwegian town, with an excellent harbour, built on three small islands on the coast of the province of Romsdal. It has 6000 inhabitants, mostly fishermen or sailors.

Aali Pasha, a distinguished Turkish statesman, born at Constantinople in 1815. At the early age of fifteen he became a clerk in the foreign office, and rose steadily from one diplomatic post to another at home, Vienna, and elsewhere, till in 1844 he became ambassador at London. This varied experience left on his acute mind a profound impression of the absolute necessity of extensive reforms in the government of the

Ottoman empire; and with these reforms, under the sultans Abdul Medjid and Abdul Aziz, the name of Aali Pasha is identified. He presided at the Commission which passed the famous reforming decree of 1856, the Hatti-Humayun. At the Congress of Paris he represented the Porte, and maintained its cause with zeal and skill. He was Grand-vizier more than once; and from 1861 till his death, held alternately with the like-minded Fual Pasha the most influential posts in the Turkish service. He was active in suppressing the Cretan rebellion in 1867-68, and in repressing Egyptian efforts to shake off the supremacy of the Porte. He died 6th September 1871.

Aalst. See ALOST.

Aar, next to the Rhine and Rhone, the largest river in Switzerland, rises in the glaciers of the Bernese Oberland, forms the Falls of Harddeck, 180 feet high, flows through the lakes Brienz and Thun, and passing the towns of Interlaken, Thun, Berne, Soleure, and Aarau, joins the Rhine above Waldshut after a course of nearly 200 miles. It is a beautiful crystal stream; its main tributaries are the Reuss and the Limmat.

Aarau, capital of the canton of Aargau (q.v.).

Aard-vark (Dutch 'earth-hog'), or CAPE ANT-EATER (*Orgetropus capensis*), one of the Edentata, and the only ant-eater with teeth. It has seven molars on each side above, and six on each side below; with neither incisors nor canine teeth. It is a stout animal, with long, pig-like snout, tubular mouth, the usual termite-catching tongue, large ears, fleshy tail, and short, bristly hair. The limbs are short and very muscular; on the fore feet are four, on the hind five powerful claws, used in burrowing and in excavating the hills of the white



Aard-vark.

ants (see TERMITES), on which it feeds. It is nocturnal in its habits, and is very inoffensive and timid. When pursued, it can burrow itself out of sight in a few minutes, working inwards with such rapidity as to make it almost impossible to dig it out. Its total length is about five feet, of which the tail is 1 foot 9 inches. Its dwelling is a burrow at a little distance from the surface, and thence it may be observed creeping at dusk. Three species are known—one in South Africa, another in Senegal, and a third in South Nubia. The flesh is considered a delicacy. See ANT-EATERS.

Aard-wolf ('earth-wolf'; *Proteles laundii*), a South African carnivore, belonging to a sub-family of Hyenidae. It is fox-like in size and habit, but has longer ears and a less bushy tail. It resembles a hyena in its sloping back, in its colour, markings, and dorsal mane, but has five toes on the fore feet, and the head is much more pointed and civet-like. The back teeth are small and simple, and there is no carnassial or special cutting-tooth. The strong, blunt claws are, as usual, non-retractile. It feeds on carrion, white ants, larvae, &c., but not on living vertebrates. It is timid and nocturnal in its habits, social but quarrelsome in its life, and tolerably swift in its pace, though usually trusting rather to burrowing than to flight. Like the Hyenas, the Aard-wolves habitually fight among themselves. See CARNIVORA, CIVET, HYENA.

Aargau (French *Argovie*), the least mountainous canton of Switzerland, on the lower course of the Aar, with the Rhine for its north boundary. Its surface is diversified with hills and valleys, and is generally fertile. Agriculture, fruit growing and cattle breeding, manufactures of cotton, and straw-plaiting are carried on; there are valuable quarries; mineral baths are in use at Baden and elsewhere. The area is about 510 sq. m., and the pop. in 1880 was 198,645, rather more than half being Protestants. German is the predominant language. The chief town is Aarau, situated on the Aar; pop. (1880) 5944.

Aarhuus, second in size of Danish cities, is a seaport on the east coast of Jutland, with a very lively transit trade by sea and by rail. Since 951 the seat of a bishop, it has a fine Gothic cathedral of the 13th century. Grain, hides, tallow, butter, eggs, cattle, and oysters are exported, while wine, petroleum, salt, sugar, tobacco, manufactured articles, and colonial wares are imported. Pop. (1870) 15,025; (1880) 24,831.

Aaron, the elder brother of Moses, was appointed his assistant and spokesman, and, in spite of his share in the idolatry of the golden calf, at the giving of the Mosaic law received for himself and his descendants the hereditary dignity of the priesthood. Aaron assisted his brother in the administration of public affairs, and was high-priest for forty years. He died at Mount Hor, on the borders of Idumea, in the 124th year of his age (Numbers, xxxiii. 39). See HIGH-PRIEST, PRIEST.

Aaron's Beard, a popular name for a number of cultivated plants: (a) *Saxifraga sarmentosa* (nat. ord. Saxifragaceae), an easily cultivated cottage-plant, usually grown in hanging pots, from which the long stems or runners droop down, bearing at intervals clumps of roundish, hairy, somewhat decorative leaves. The flowers have a close resemblance to those of London Pride.

(b) *Hypericum calycinum*, also called Rose of Sharon (Hypericaceae). It is a native of the S.E. of Europe, has a prostrate, creeping, shrubby habit, and bears (from July to September) very large bright yellow flowers 3 to 4 inches in diameter.

(c) *Geropogon hirsutus* (Compositae), a South European annual of easy culture, related to Tragopogon (Goat's Beard), bearing purplish capitula.

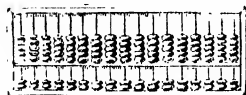
Ababdeh, a people allied to the Bishari, inhabiting parts of Upper Egypt and Nubia, and included by some authorities in the Ethiopic family of the Hamites. See AFRICA.

Abaca, a species of plantain (*Musa textilis*), which yields a valuable fibre, the so-called *Manilla Hemp* of commerce. It is a native of the Philippine Isles, where it is extensively cultivated; and is like the Banana (q.v.) in habit of growth. The

leaf-stalks are split into long stripes, beaten with clubs, hackled, washed, and dried. From the finer fibres, sometimes 15 feet long, exceedingly fine tissues are woven. The coarser make extremely durable and tenacious cordage, and are largely exported for that purpose. The old ropes are manufactured into very strong wrapping-paper. See BANANA.

Abaco, GREAT and LITTLE, islands of the Bahama group. The largest is 80 miles long. See BAHAMAS.

Abacus, an instrument sometimes employed in infant-schools to make the elementary operations of arithmetic palpable. It consists of a frame with a number of parallel wires, on which beads or counters are



Chinese Abacus.

strung, being variously arranged to represent units, tens, &c. By the ancient Romans it was used in practical reckoning, and it is still in use in some parts of Russia, in the Caucasus, Persia, and China. According to Professor Knott's monograph on *The Abacus* (Yokohama, 1886), the abacus was probably a Semitic invention, introduced by the Semites to the Aryans, and so passed on to the Chinese. An improved abacus is called 'adder' in the United States.

Abacus, in Architecture, is a square or oblong level tablet placed above the capital of a column, and supporting the entablature. In the Doric, old Ionic, and Tuscan orders, the abacus is either flat and square, or has a moulding on the upper edge; but in the new Ionic, Corinthian, and Roman orders, the abacus has concave sides, with truncated angles. In the Norman style, it may be square or octagonal; in Early English it is often circular, but in early French Gothic is usually square. In later Gothic it is generally octagonal. See COLUMN.

Abaddon, a Hebrew word meaning 'destruction,' used in Job as a poetical term for Sheol, the kingdom of shadows, in rabbinical legends the deepest place in hell; in the Apocalypse, the name of the angel of the abyss, the bottomless pit, the same as Apollyon.

Abakansk, a fortified Siberian town, on the Alakan, near its junction with the Yenisei, in the government of Yeniseisk. Pop. 2000.

Abana and Pharpar, mentioned in Scripture as rivers of Damascus. The former is generally identified with the Barada, flowing through the city; the latter with the Awaj, which rises on the S.E. slopes of Hermon, passes within 8 miles of Damascus, and falls into a lake to the south.

Abancourt, CHARLES XAVIER JOSEPH D', a French minister during the Revolution, born at Donai in 1758. A nephew of Calonne, and a revolutionist, he advanced rapidly in the army, and became minister of war in June 1792. Two months later he was denounced by Thuriot, and was murdered by the mob at Versailles, September 9, 1792.

Abandonment. Abandoning an action, in Scottish legal procedure, signifies the act by which a pursuer, at any time before final judgment, abandons or withdraws from his action on the payment of the costs incurred; the effect being that, although his action is dismissed, he is at liberty to bring another action on the same grounds. The same purpose is effected in England by the plaintiff, in the High Court of Justice, giving a notice called discontinuance. In England, however, this is in the power of the plaintiff only before any step has been taken subsequent to the statement of defence.

Afterwards, the authority of the judge is required; one reason for this distinction being that in England a defendant may obtain decree against the plaintiff on his counter-claim, a convenient practice not yet introduced to Scotland. As regards criminal proceedings, these may in England be stopped by a warrant of the Attorney-General, called *Nolle prosequi* (q.v.), granted where justice requires; in Scotland, where criminal proceedings are always in the hands of the public prosecutor, the technical expression is 'deserting the diet,' which can be done before a jury is sworn, and does not exclude a new prosecution.

Abandonment, in Marine Insurance, signifies the relinquishment to the underwriter of all interest in the subject of insurance, and is implied in every settlement for a total loss. Notice of abandonment is given by the insured, where he has reasonable ground for thinking there is a total loss, but it may not be accepted by the underwriter. See **INSURANCE**.

Under the Abandonment of Railways Acts of 1850, 1867, and 1869, the Board of Trade may, on good cause shown, sanction the abandonment of railways, even though partly made, if three-fifths in value of the shareholders consent. The effect is to relieve the company from liability to carry out the undertaking. Compensation is made to landowners and contractors, and usually the deposit-money is applied as assets.

Abandonment is often applied to the act of master and crew leaving a ship after collision. This they should not do if by ordinary care and skill they will not be exposed to extraordinary risk of life.

Abandonment or exposure of children under the age of two, so as to endanger life or permanently injure health, is an offence punishable in England by penal servitude, under the Offences against the Person Act, 1861. In Scotland, the exposure or desertion of children is a crime at common law.

In the United States, non-user does not generally constitute abandonment, but where an abandonment is acted upon in good faith, it destroys the original owner's rights. Legal rights once vested, must be divested according to law, while equitable rights may be abandoned at pleasure. There may be an abandonment of an easement, an improvement, an invention or discovery, of a trust fund, a mining claim, a right under a charter or land warrant.

Abarbanel, **ABRABANEL**, or **ABRAVANEL**, **ISAAC BEN JEHUDAH**, a Jewish writer, was born at Lisbon in 1437. He was employed in affairs of state by Alfonso V. of Portugal; under his successor, John II., he was suspected of treason, and obliged to flee, his property being confiscated (1483). For a time he served King Ferdinand of Aragon, but he shared in the expulsion of the Jews from Spain (1492), and died at Venice in 1508. His works comprise critical and doctrinal commentaries on the Bible, with important philosophical treatises. His eldest son, **JUDAH LEON** (Leo Hebræus), was a doctor and philosopher, author of *Dialoghi di Amore* (1535).

Abarim, the range of highlands, or mountains, to the east of the Jordan, in the East of Moab. The highest point is Mount Nebo, from which Moses had his 'Pisgah view' of Palestine. It is somewhat uncertain whether Pisgah was the same as Abarim, or merely a part of it. Ancient rude altars, probably as old as the time of the Amorites, were discovered here by Captain Conder in 1881.

Abased, or **ABAISSE**, in Heraldry, signifies that a chevron, fess, or the like, is placed lower than in its usual position.

Abatement. This is a term used in various senses in the law of England. (1) Abatement of Freehold, where a stranger without right enters and gets possession before the heir or devisee. (2) Abatement of Nuisance, which means the act of a party in removing, with the least possible damage, any nuisance or unlawful obstruction from his property. (3) Abatement of Actions formerly took place by the death, marriage, or bankruptcy of a party; but under the Judicature Act the action proceeds, the necessary parties being added, except where the right of action does not transmit. *Plac in abatement* are those known in Scotland as 'no title to sue,' and 'all parties not called,' and are now dealt with in the same way. The term is also used in both England and Scotland to denote the reduction of legacies where the estate is insufficient to pay in full. *Abatement*, or *rebate*, is the discount allowed for cash, or paid on a bill, and is also used for a deduction sometimes made by the Customs House on damaged goods, or for loss in warehouses.

Abatement is also a reduction of a legacy, general or specific, on account of the insufficiency of the estate of the testator to pay his debts and legacies.

In the United States courts, by act of congress, personal actions do not abate by death of a party, if the cause of action survives. Unlike the abatement of a suit at common law, the death of one of the parties to a bill in equity before final decree has the effect of suspending the proceeding, but does not extinguish the right of further prosecution, by proper representatives, within a reasonable time.

Abatements, in Heraldry, are marks of disgrace alleged in some heraldic treatises to have been borne by persons who had been guilty of unknighly conduct. Monestrier justly calls them 'sottises Anglaïses' (English absurdities); and, as they were never in actual use, they need not be here described in detail.

Abattis (Fr.) is an old and simple species of intrenchment, consisting of trees felled and laid side by side; the butt ends are fixed in the earth, the smaller twigs cut off, and the branches are directed towards the enemy.

Abattoir is the French name, sometimes used in Britain, for a Slaughter-house (q.v.).

Abauzit, **FIRMIN**, was born of Protestant parentage at Uzès, in Languedoc, 11th November 1679, and on the revocation of the Edict of Nantes (1685) was despatched by his mother to Geneva. Here he prosecuted his studies with such intense ardour that he became versed in almost all the sciences. He travelled in Holland and England in 1698, and attracted the notice of such men as Bayle and Newton. King William wished to retain him in England; but his affection for his mother recalled him to Geneva, where he died March 29, 1767. He helped to translate the New Testament into French (1726); and published numerous theological and archaeological treatises, which were collected in two vols. (Amst. 1773). Rousseau, who hated to praise a contemporary, penned his solitary panegyric on Abauzit in the *Nouvelle Héloïse*.

Abbadie, **ANTOINE THOMSON** and **ARNOULD-MICHEL D'**, born in Dublin of French family, the former in 1810, the latter in 1815. Educated in France, they became famous as travellers in Abyssinia between 1837 and 1848. The elder brother published on his return a catalogue of Ethiopian MSS., the *Géodésie d'Éthiopie* (1860-73); and in 1881 a Dictionary of the Amharima (Amharic) language. The younger published, in 1868, his *Douze Ans dans la Haute-Éthiopie*; and he has also distinguished himself by his studies of the Basque language.

Abbas, the uncle of Mohammed, at first hostile to him, but ultimately the chief promoter of his religion, was born in 566, and died 652. He was the founder of the family of the Abbasides, who ruled as califs of Bagdad from 750 till the Mongol conquest in 946, but continued to exercise the spiritual functions of the califate, first at Bagdad, and from 1258 in Egypt under the protection of the Mamelukes, till 1517, when that dignity passed to the Turkish sultan. See MOHAMMED, CALIF.—The ABBASIDES in Persia were descended from the race of the Soffi, who ascribed their origin to the calif Ali. This race acquired dominion in 1500, and became extinct in 1736. Among them, Abbas I., surnamed the Great, was the most eminent ruler. He came to the throne 1586, and died 1628. His reign was marked by a series of victories over the Turks. In alliance with England, he destroyed, in 1621, the Portuguese colony at Ormuz. See PERSIA.

Abbas-Mirza, a Persian prince and warrior, the favourite son of the Shah Feth-Ali, born in 1783. He was early convinced of the advantages of western civilisation, and with the help of European officers he first of all applied himself to the reform of the army. He led the Persian armies with great bravery, but with little success, in the wars with Russia, 1811-13, and 1826-28. In 1829 he visited St Petersburg, and was sent back to Persia loaded with presents. He died in 1833.

Abbas Pasha, viceroy of Egypt, was grandson of the famous Mehemet Ali. Born in 1813, he was early initiated into public life, and in 1841 he took an active part in his grandfather's Syrian war. The death of his uncle, Ibrahim Pasha, in 1848, called him to the viceregal throne at Cairo. During his brief reign he did much to undo the progress that had been made under Mehemet Ali, and proved himself bigoted, indolent, and sensual, a bitter enemy to foreigners and their civilisation. At the outbreak of the Crimean war he placed a force of 15,000 men and his fleet at the disposal of the Sultan. He was found dead, not without suspicion of foul play, on the morning of 13th July 1854.

Abbate, NICCOLO DELL', was born at Modena in 1512, and died at Paris in 1571. He was an able and skilful artist in fresco-painting, and was influenced both by Correggio and Giulio Romano. There is an altar piece by him at Dresden; but his mythological frescoes at Fontainebleau are now mostly destroyed.

Abbé, originally the French name for an abbot, but often used in the general sense of a priest or clergyman. By a concordat between Pope Leo X. and Francis I. (1516), the French king had the right to nominate upwards of 200 *Abbes commendataires*, who, without having any duty to perform, drew a third of the revenues of their monasteries. They were not necessarily clergy, but were expected, unless exempted by a dispensation, to take orders. The hope of obtaining one of those sinecures led multitudes of young men, many of them of noble birth, to enter the clerical career, which, however, seldom went further than taking the inferior orders; and it became customary to call all such aspirant abbés, jocularly, *Abbes of St Hope*. They formed a considerable and influential class in society; and an abbé, distinguished by a short violet coloured robe, was often found as chaplain or tutor in noble households, or engaged in literary work. This class of nominal clergy disappeared at the Revolution.

Abbeokuta, or A EOKUTA, a city, or rather collection of small towns or villages, capital of the territory of Egba, in the Yoruba country in Africa. It is about 80 miles N. of Lagos, on the Bight of Benin; and is situated 560 feet above

the sea-level, on an undulating plain. The city is surrounded by a wall of hardened mud, from 18 to 20 miles in circumference, between 5 and 6 feet high. The main town Burton found to measure 4 miles by 2. The streets are narrow and irregular, and the only scavengers are the sun, the vulture, and the pig. There is a trade in palm-oil and grain, and the markets contain European goods. Pop. estimated at 150,000.

Abbess, the superior of a religious community of women, corresponding in rank and authority to an Abbot (q.v.), except in not being allowed to exercise the spiritual functions of the priesthood such as preaching or confession. See NUN.

Abbeville, a prosperous manufacturing town of France, in the dep. of Somme, stands on the river Somme, 12 miles from its mouth, and 49 miles S. of Boulogne. It is built partly on an island, and partly on the banks of the river; the streets are narrow and ill paved; and the houses, some of them picturesque, are built mostly of brick and wood. The west front of the church of St Wolfram, commenced in the reign of Louis XII., is a splendid example of the Flamboyant style, with noble portals and covered with rich tracery. Ruskin speaks of Abbeville as 'the preface and interpretation of Rouen' in respect of its architecture. The museum has a rich collection of antiquities. The chief manufactures of Abbeville are woollen cloths, carpets, linens, sackings, and sugar. It has some coasting trade. Near Abbeville were found, in 1841, the flint implements, associated with the remains of the mammoth and rhinoceros, which have such an important bearing on the controversy as to the antiquity of man. Pop. (1881) 19,283.

Abbey. See MONASTERY, SANCTUARY.

Abbiatè-Grasso, a town of Italy, 14 miles WSW. of Milan, in a district noted for cattle-breeding and the production of rice. Pop. 7025.

Abbot is a word derived from the Chaldee *abba* ('father'), through the Latinised form *abbas* (gen. *abbatis*), whence come also the Italian *abbate*, the French *abbé* (q.v.), and the German *abt*. The Chaldee word was adopted by the Christian communities as a form of invocation in prayer (see Gal. iv. 6); but the derivative name, at first used of reverend persons, especially aged monks, was ere long reserved, as a title of dignity, for the head of a monastery or abbey. Until the beginning of the 10th century, the head of every monastery was called abbot; but after the reformation of the order of Benedictines, monasteries arose that were dependent upon the mother monastery of Clugny and without abbots, being presided over by *priors* or *pro-abbates*. Many of the orders founded after the 10th century rejected the title, and called their superior *propositus* or *prior* (as the Carthusians, Dominicans, Carmelites, Augustinians), *custos* or *guardian* (as the Franciscans), *major* or *rector*. The relation of the abbot to his order on the one hand and to his monks on the other varied greatly in the different orders; the Benedictine abbot was wholly independent, while a supreme council at Clairvaux might interfere in the management of all the Cistercian communities. But the abbot was always entitled and bound to enforce the observance of the rules of his order, to administer the goods of the monastery, and to exact unconditional obedience from his monks. Since the 6th century, at least in the Eastern Church, abbots have generally held clerical orders, but at first, and in the Western Church even down to the 11th century, they were not necessarily priests. By the second Nicene Council (787), abbots were empowered to consecrate monks for the lower sacred orders; but they

remained in subordination under their diocesan bishops until the 11th century. As abbeys became wealthy, abbots increased in power and influence; many received episcopal titles; and all were ranked as prelates of the church next to the bishops, and had the right of voting in church-councils. Even abbesses contended for the same honours and privileges, but without success. In the 8th and 9th centuries, abbeys began to be granted by the kings to laymen, as rewards for military service; professedly they were granted only temporarily *in commendam*. Occasionally an abbey voluntarily elected a powerful noble as its head for the sake of his protection, the titular abbot enjoying the revenues, but interfering little with the management of his abbey. In the 10th century, many of the chief abbeys in Christendom were under lay-abbots (*Abbatēs milites*, or *Abbat-comites*), while subordinate deans or priors had the spiritual oversight. The members of the royal household received grants of abbeys as their maintenance, and the king kept the richest for himself. Sometimes convents of nuns were granted to men, and monasteries to women of rank. Gradually it became not unusual for one man, lay or ecclesiastic, to hold two or more abbeys at once; but these and the like abuses were, in a great measure, reformed during the 10th century.

The abbot was usually under the jurisdiction of his diocesan bishop; but there were many cases of exempted abbots, who acknowledged no superior but the pope. They then exercised a quasi-episcopal authority over what was practically their diocese, and enjoyed the right to wear the episcopal insignia—an honour often granted without exemption from the authority of the bishop, but conveying the rank of *mitred abbot*. In England there were twenty-four mitred abbots, who, however, sat in parliament simply as holding baronies under the crown. On the Continent, not a few abbots had princely titles and privileges, voting in the national councils. The election of an abbot belongs, as a rule, to the chapter or assembly of the monks, and is afterwards confirmed by the pope or by the bishop, according as the monastery is independent or under episcopal jurisdiction. But from early times, the pope claimed the right of conferring many abbeys, and the concordat of 1516 gave a similar privilege to the king of France. Popes as well as princes frequently abused this recognised or usurped power by giving abbeys to members of the secular clergy, who were accordingly not bound by the monastic rules of the community over which they presided (especially in France, see *ABBE*). Such abbots, independent of monastic vows, were *secular abbots*, while those subject to the rule (*regula*) of a monastic order were *regular abbots*. In countries which embraced the Reformation, the possessions of abbeys were mostly confiscated by the crown; but in Hanover, Brunswick, and Württemberg, several monasteries and convents were retained as educational establishments, the heads of which retained the title of abbot or abbess. In the Greek Church, the superiors of convents are called *Hegumen* or *Mandrites*, and general abbots *Archimandrites*. Amongst Copts and Syrians, *abba* is a title given to bishops or patriarchs. The head of the Abyssinian Church is called *abba* ('our father'). See *MONACHISM*.

Abbot, EZRA, scholar and biblical critic, was born in Jackson, Maine, April 28, 1819. He studied at Bowdoin College; and in 1856 became assistant-librarian at Harvard University. He furnished important contributions to the *Bibliotheca Sacra*, the *Unitarian Review*, and other periodicals, and was a member of the New Testament Revision Company. In 1872 he was chosen

professor of New Testament Criticism in the Harvard Divinity School. Among his works are *New Discussions of the Trinity, Literature of the Doctrine of a Future Life, and The Authorship of the Fourth Gospel*. He was LL.D. of Yale, and D.D. of Harvard. He died March 21, 1884.

Abbot, GEORGE, Archbishop of Canterbury, was the son of a Guildford cloth-worker, and was born 29th October 1562. In his seventeenth year he entered Balliol College, Oxford, where he obtained a fellowship (1583); and through Lord Breckhurst's influence he rose to be Master of University College (1597), Dean of Winchester (1600), and thrice Vice-chancellor of Oxford University (1600-5.) To a new patron, the Earl of Dunbar, with whom he visited Scotland (1608), he owed his promotion to the sees of Lichfield (1609), of London (1610), and finally of Canterbury (1611). A sincere but narrow-minded Calvinist, he was equally opposed to Catholics and to heretics, Arian or Arminian. He fined two recusants, he burnt two Arians, he consented that a clergyman should be put to the torture; but, withal, he was charitable, and far less obsequious to the kingly will than most of his contemporaries. His closing years were clouded by an accident, the shooting of a gamekeeper (1621); and during the last six he was almost superseded by his great adversary, Laud. He died at Croydon, 4th August 1633, and was buried at Guildford, where in 1619 he had founded a hospital.—His brother, ROBERT (1560-1617), from 1615 Bishop of Salisbury, was a learned theologian, and author of several controversial treatises.

Abbot. See COLCHESTER, LORD.

Abbotsford, the seat of Sir Walter Scott, stands on the south bank of the Tweed, a little above its confluence with Gala Water, and 2 miles W. of Melrose. Before it became, in 1811, Sir Walter's property, the site of the house and grounds formed the small farm of 'Clarty Hole'; and the poet devised the new name, loving thus to connect himself with the days when Melrose abbots forded the Tweed. On this spot, a sloping bank overhanging the river, with the Selkirk hills behind, he built a small villa, now the western wing of the mansion. In 1817-21, he added the other portions of the building, on no set plan, but with the desire of combining in it some of the features (and even actual remains) of those ancient works of Scottish architecture which he most venerated. The result was that picturesque and irregular pile, aptly characterised as 'a romance in stone and lime.' The property passed to Mr Hope-Scott, who married the novelist's grand daughter, and again in 1874, by marriage, to the Hon. Mr Maxwell-Scott. See Washington Irving's *Abbotsford* (1835).

Abbott, CHARLES. See TENTERDEN, LORD.

Abbott, EDWIN A., D.D., theologian and philologist, was born in London in 1838. After a brilliant career at St John's, Cambridge, he obtained a fellowship, was master at King Edward's School, Birmingham, and at Clifton College, and was appointed in 1865 headmaster of the City of London School. He has been select preacher at both universities, and his sermons have given him a place in the front rank of the more liberal theologians within the English Church. His view of Christianity he stated in *Through Nature to Christ* (1877). He is understood to be the author of *Philochristus* and *Onesimus*, two romances of the first age of the church, and of *The Kernel and the Husk* (1887), an amplification of the view of Christianity contained in the preceding. In 1884 he published, in conjunction with W. J. Rushbrooke, *The Common Tradition of the Synoptic Gospels*. His well-known *Shakspearian*

Grammar (1870) has been followed by several works of great practical value on the teaching of English. Of more general interest are his *Bacon and Essex* (1877), and *Francis Bacon* (1885).

Abbott, Jacob, a native of the United States, was born at Hallowell, Maine, in 1803, was professor of mathematics in Amherst College from 1825 till 1829, and was subsequently a Congregational pastor. In 1838 he began writing those simple and popular works, mainly for the young, by which his name was so widely known. His most popular work is *The Young Christian*, the 'memorial edition' of which contains a life by his son. He published over 200 volumes, amongst which are *The Franconia Stories*, 10 vols.; *Histories for the Young*, 19 vols.; *Marco Paul's Adventures*, 6 vols.; *Harper's Story Books*, 36 vols.; *The Rollo Books*, 36 vols.; *Science for the Young*, 4 vols.; *American Histories for Youth*, 8 vols. He died October 31, 1879.

LYMAN ABBOTT, D.D., his son, was born at Roxbury, Massachusetts, in 1835; studied law, but subsequently became a Congregational minister. He has edited more than one religious journal, and is the author of several theological works, including a Religious Dictionary and a New Testament Commentary.

Abbott, John S. C., an American author, brother of the Rev. Jacob Abbott, was born at Brunswick, Maine, in 1805. He studied at Bowdoin and Andover, and was subsequently minister in Worcester and Roxbury. Among his works may be named the *Mother at Home* (1833); *Histories of Marie Antoinette, Josephine, Madame Roland, Coletz; History of Napoleon Bonaparte*, 2 vols.; *History of the French Revolution; History of the Civil War in America* (2 vols., 1866);

History of Napoleon III. (1868). Most of his books have obtained an extensive circulation; but as a historian he is not to be relied on; his history of the first Napoleon is an extravagant eulogy. He died June 17, 1877.

Abbreviations are contrivances in writing for saving time and space. A syllable (usually the initial one), initial or other letters, or arbitrary signs, are made to do duty for whole words and phrases. In ancient inscriptions, in Greek and Roman MSS., in mediæval documents, such saving of space was extremely valuable, and abbreviation and contraction was carried to a great length. To decipher such devices special training is necessary; and Palæography (q.v.) and Diplomatics (q.v.) are largely concerned with interpreting them. The contractions (with some abbreviations) used in ancient MSS. and books are dealt with under CONTRACTIONS. Here only the principal abbreviations still in use are given. The most obvious, such as *Rev.* for *Reverend*, *chap.* for *chapter*, *Dec.* for *December*, *Wed.* for *Wednesday*, *gov.* for *governor*, *lieut.* for *lieutenant*, *sec.* for *secretary*, are omitted; and there are whole groups of abbreviations for almost every branch of knowledge, which are intelligible from the context in which they occur, and are too numerous to be included in any general list: adj. for adjective; Rs., rupees; Cor., Epistle to the Corinthians; G.W.R., Great Western Railway; P.G.M., Past Grand-master Mason; Slav., Slavonic; Syr., Syriac; the compounds of N. S. E. W., north, south, east, west, as E.N.E., &c.; deg., ft., gal., &c. in measures. For chemical symbols, see ATOMIC WEIGHTS, CHEMISTRY, &c.

The following is a list of the more important abbreviations in general use:

A 1.	First-class (of ships).	B.V.M.	Blessed Virgin Mary.	D.L.O.	Dead letter Office.
A B.	Abbe-bodied seaman.	C.	Century; A hundred;	Do.	Doth (Ital.), the said; the same.
A.B.	Actum Baccalariatus, Bachelor of Arts.	C.A.	Chartered Accountant.	D.O.M.	Deo optamo merito, To God, best and greatest.
A.B.F.M.	American Board of Foreign Missions.	Cal.	California.	Dr.	Doctor; Debtor.
Abp.	Archbishop.	Canab.	Canabrigensis, of Cambridge.	D.Sc.	Doctor of Science.
A.B.S.	American Bible Society.	Canuar.	Canabrigensis, of Canterbury.	D.T.	Dakota Territory.
Acct. or A/c.	Account.	Cap.	Capital, chapter.	D.T.	Doctor of Theology.
A.D.	An Domini, in the year of Lord	C.B.	Companion of the Bath.	D.V.	Deo Volente, God willing.
A.D.C.	Aide-de-camp.	C.C.C.	Corpus Christi College.	Dwt.	Penny weight.
Ad lib.	Ad libitum, at pleasure.	C.D.S.	Companion of the Distinguished Service Order (founded 1886).	Ebor.	Eboracensis, of York.
Ad.	Aditis [a], in the year of his age.	C.D.V.	Carte-de-visite.	E.C.	Established Church.
A.E.B.S.	American and Foreign Bible Society.	C.E.	Civil Engineer.	Ed.	Editor; Editor.
A.G.	A lieutenant-general.	C.F.	Confir, compare.	ex. or	Ex. gr., Eximii Gratia, for example.
A.H.	Anno Heptem, in the year of the Heptem (672 A.D.).	C.H.	Court-house.	E.I.	East Indies.
A.I.A.	Associate of the Institute of Actuaries.	C.I.	Order of the Crown of India.	Etc.	Et cetera, and the rest; and so on.
Ala.	Alabama.	C.I.E.	Companion of the Order of the Indian Empire.	Ex.	Executor.
A.M.	Ante Meridiam, before noon.	C.J.	Chief Justice.	f.	following; fl. following (plur.).
A.M.	Anno Mundi, in the year of the world.	C.M.	Certificated Master.	F., Fahr.	Fahrenheit.
A.M.	Artem Magister, Master of Arts.	C.M.	Chirurgus Magister, Master in Surgery.	F.B.S.	Fellow of Botanical Society.
A.R.A.	Associate of Royal Academy.	C.M.G.	Companion of the Order of St Michael and St George.	F.C.	Free Church of Scotland.
A.R.H.A.	Associate of the Royal Librarian Academy.	C.M.S.	Church Missionary Society.	F.C.P.	Fellow of College of Preceptors.
Ark.	Arkansas.	C.O.D.	Case of Company; county.	Fp.	Foolscap.
A.R.S.A.	Associate of the Royal Scottish Academy.	Co.	Company; county.	F.C.S.	Fellow of the Chemical Society.
A.S.	Anglo-Saxon.	C.O.D.	Company; county.	F.D.	Fidei Defensor, Defender of the Faith.
A.U.C.	Ab Urbe Condita, from the building of Rome (753 B.C.).	Conn. or Cr.	Connecticut.	For.	For, made (it).
A.V.	Artillery Volunteer.	Crim. Con.	Criminal Conversation.	F.E.I.S.	Fellow of the Educational Institute of Scotland.
A.V.	Authorized Version of the Bible.	C.S.I.	Companion of the Star of India.	F.E.A.	Fellow of Faculty of Actuaries.
Ax.	Axiom.	C.T.	Certificated Teacher.	F.F.P.S.	Fellow of the Faculty of Physicians and Surgeons (Glasgow).
B.A.	Baccalarius Artium, Bachelor of Arts.	Cut.	Current—the present month.	F.G.S.	Fellow of Geological Society.
Bart. or Bt.	Baronet.	Cwt.	Hundredweight.	F.K.Q.C.P.I.	Fellow of the King's and Queen's College of Physicians in Ireland.
B.C.	Before Christ.	d.	Dole, delete, erase.	Fl.	Florida, flourished.
B.C.L.	Bachelor of Civil Law.	D.C.	District of Columbia.	Fia.	Florida.
B.D.	Bachelor of Divinity.	D.C.L.	Doctor of Civil Law.	F.L.S.	Fellow of the Linnean Society.
B.L.	Bachelor of Laws.	D.D.	Doctor of Divinity.	F.M.	Field-marshal.
B/l.	Bill of lading.	Deg.	Degree of Latitude, and Longitude.	F.O.	Field-officer.
B.M.	Bachelor of Medicine.	Del.	Delaware.	F.O.B.	Free on board.
B.M.	British Museum.	Del.	Delaware.	F.P.	Fire-plug.
Bp.	Bishop.	Dep.	Deputy, Department.	F.P.S.	Fellow of Philological Society.
B.Sc.	Bachelor of Science.	D.G.	Dei Gratia, by the grace of God.	F.R.A.S.	Fellow of the Royal Astronomical; of the Royal Asiatic Society.
		D.L.	Deputy Lieutenant.		
		D.Lit.	Doctor of Literature.		

ABBREVIATIONS

F.R.C.P.	Fellow of the Royal College of Physicians.	L.I.	Long Island; Light Infantry.	Op. cit.	<i>Opere citato</i> , in the work quoted.
F.R.C.S.	Fellow of Royal College of Surgeons.	Linn.	Linnaean.	Or.	Oregon.
F.R.C.S.E.	Fellow of Royal College of Surgeons, Edinburgh.	L.L.A.	Lady Literate in Arts.	O.S.	Old Style.
F.R.G.S.	Fellow of the Royal Geographical Society.	L.L.B.	<i>Legum Baccalaureus</i> , Bachelor of Laws (the plural being denoted by the double L).	O.S.B.	Order of St Benedict.
F.R.S.	Fellow of the Royal Society.	L.L.D.	<i>Legum Doctor</i> , Doctor of Laws.	O.T.	Old Testament.
F.R.S.E.	Fellow of the Royal Society, Edinburgh.	Loc. cit.	<i>Loco citato</i> , in the place quoted.	Oxon.	Oxonensis, of Oxford.
F.S.A.	Fellow of the Society of Antiquaries, or of Arts.	Long.	Longitude.	Oz.	Onice.
F.S.S.	Fellow of Statistical Society.	Loq.	<i>loquitur</i> , speaks.	P.	President; Professor.
F.Z.S.	Fellow of Zoological Society.	Lon. or La.	Louisiana.	Pa.	Pennsylvania.
Ga. or Geo.	Georgia.	L.R.C.P.	Licentiate of the Royal College of Physicians.	P.C.	Privy Counsellor; Police Constable.
G.B.	Great Britain.	L.R.C.P.E.	— Edinburgh.	P.C.S.	Principal Clerk of Session.
G.C.B.	Grand Cross of the Bath.	L.R.C.S.	Licentiate of the Royal College of Surgeons.	P.E.	Protestant Episcopal.
G.C.L.H.	Grand Cross of the Legion of Honour.	L.S.	<i>Locosigilli</i> , the place of the seal.	P.E.I.	Prince Edward Island.
G.C.M.G.	Grand Cross of St Michael and St George.	L.S.A.	Licentiate of the Society of Apothecaries.	Penm.	Pennsylvania.
G.C.S.I.	Grand Cross of the Star of India.	L.S.D.	<i>Liber, Solidi, Denarii</i> , pounds, shillings, pence.	Per ann.	<i>Per annum</i> , by the year.
Gk. or Gr.	Greek.	LXX.	Septuagint version (70).	Per cent.	<i>Per centum</i> , by the hundred.
G.P.O.	General Post-office.	M.	<i>Mille</i> , a thousand; Monsieur.	Ph.D.	<i>Philosophie Doctor</i> , Doctor of Philosophy.
H.B.M.	His or Her Britannic Majesty.	M.A.	<i>Magister Artium</i> , Master of Arts.	Phila.	Philadelphia.
H.E.I.C.S.	Hon. East India Co.'s Service.	M.B.	Massachusetts.	Pinx.	<i>Pinxit</i> , painted (it).
H.G.	Horse Guards.	M.C.	Member of Medicine.	P.M.	<i>Post Meridieum</i> , after noon.
H.I.H.	His Imperial Highness.	M.C.	Member of Congress; Master of Ceremonies.	P.M.	<i>Post Mortem</i> , after death.
H.M.S.	His or Her Majesty's Service, or Ship.	M.C.G.	Marylebone Cricket Club.	P.M.G.	Postmaster-general.
H.P.	Horse-power.	M.D.	<i>Medicine Doctor</i> , Doctor of Medicine.	P.O.	Post-office.
H.R.	House of Representatives.	Md.	Maryland.	P.O.O.	Post-office order.
H.R.H.	His or Her Royal Highness.	Mlle.	Mademoiselle.	Pp.	Pages.
H.S.H.	His Serene Highness.	Me.	Maine.	P.P.	Parish priest.
la.	Iowa.	M.E.	Methodist Episcopal.	P.P.C.	<i>Pour prendre congé</i> , to take leave; to say good-bye.
lb. or libd.	<i>libidem</i> , in the same place.	Mem.	Memento, Remember.	P.P.S.	Postscript additional.
Id.	<i>Idem</i> , the same.	M.F.H.	Master of Fox-hounds.	P.R.	Prize-ring; Porto Rico.
i.e.	<i>Id est</i> , that is.	M.L.C.E.	Member of the Institute of Civil Engineers.	P.R.A.	President of Royal Academy.
I.I.S.	For the Greek capitals IHΞ, the first three letters of IHΞΟΥΣ, Jesus; erroneously supposed to be <i>Jesus Ikoninam Salvator</i> , Jesus the Saviour of men.	Mich.	Michigan.	P.R.I.B.A.	President of the Royal Institute of British Architects.
Ill.	Illinois.	Minn.	Minnesota.	Pro.	Professional.
Imp.	Imperator, Emperor; Imperial.	Miss.	Mississippi.	Pro. ten.	<i>Pro tempore</i> , for the time.
Ineog.	<i>Incognito</i> (Ital.), unknown.	M.L.A.	Member of Legislative Assembly.	Pro. v.	<i>Proximo</i> , in the next.
Ind.	Indiana.	M.L.C.	Member of Legislative Council.	P.R.S.	President of the Royal Society.
Ind. Ter.	Indian Territory.	MM.	Messieurs.	P.S.	<i>Post scriptum</i> , Postscript.
Inf.	<i>Infra</i> , below.	Mne.	Madame.	P.T.O.	Please turn over.
I.N.R.J.	<i>Iesus Nazarenus Rex Iudæorum</i> , Jesus of Nazareth, king of the Jews.	Mo.	Missouri.	P. & O.	Peninsular and Oriental Co.
Inst.	<i>Instante</i> (mense), Instant, of the present month; Institute.	M.P.	Member of Parliament.	Q.	Query or Question.
Inv.	<i>Invenit</i> , designed (it).	M.P.S.	Member of the Philological (or Pharmaceutical) Society.	Q.B.	Queen's Bench.
I.O.G.T.	Independent Order of Good Templars.	M.R.A.S.	Member of the Royal Academy of Sciences.	Q.C.	Queen's Counsel.
I.O.O.F.	— Oddfellows.	M.R.C.P.	Member of the Royal College of Physicians.	Q.E.D.	<i>Quod erat demonstrandum</i> , which was to be demonstrated.
I.O.U.	I owe you.	M.R.C.S.	Member of the Royal College of Surgeons.	Q.E.F.	<i>Quod erat faciendum</i> , which was to be done.
I.P.D.	<i>In Presenti Dominorum</i> , in presence of the Lords (of Session), Edinburgh.	M.R.C.V.S.	Member of the Royal College of Veterinary Surgeons.	Q.M.G.	Quartermaster-general.
I.T.	Idaho Territory.	M.R.I.	Member of Royal Institution.	Q.S.	<i>Quantum sufficit</i> , enough.
I.T.	Indian Territory.	M.R.I.A.	Member of Royal Irish Academy.	Q.S.	Quarter Sessions.
It.	Italian.	MS.	Manuscript.	Q.V.	<i>Quod erat</i> , which was.
J.C.	<i>Juris Consultus</i> , Jurisconsult.	MSS.	Manuscripts.	R.	Résumé.
Jno.	John.	M.T.	Montana Territory.	R.	<i>Recipe</i> (in prescriptions), Take.
J.P.	Justice of the Peace.	Mus. Bar.	Bachelor of Music.	R.	<i>Receve</i> or <i>Receve</i> , King or Queen.
J.U.D.	<i>Juris Utriusque Doctor</i> , Doctor both of Civil and of Canon Law.	Mus. Doc.	<i>Musice Doctor</i> , Doctor of Music.	R.A.	Royal Academician; Royal Artillery.
Kan.	Kansas.	N.	North.	R.A.M.	Royal Academy of Music.
K.B.	Knight of the Bath.	N.A.	North America.	R.C.P.	Royal College of Preceptors.
K.C.	King's Counsel.	N.B.	North Britain; New Brunswick.	R.E.	Royal Engineers.
K.C.B.	Knight Commander of the Bath.	N.H.	North Holland.	Rep.	Representative; Republic.
K.C.H.	Knight Commander of the Order of Hanover.	N.I.	New Jersey.	R.H.A.	Royal Horse Artillery.
K.C.M.G.	Knight Commander of St Michael and St George.	N.J.	New Jersey.	R.H.G.	Royal Horse Guards.
Ken. or Ky.	Kentucky.	N.O.	No date.	R.I.	Rhode Island.
K.G.	Knight of the Garter.	N.E.	New England.	R.I.P.	<i>Requiescat in Pace</i> , May he rest in peace.
K.G.C.	" the Grand Cross.	Neb.	Nebraska.	R.M.	Royal Marines; Royal Mail.
K.G.C.B.	Knight Grand Cross of the Bath.	Nem. con.	<i>Nemine contradicente</i> , no one contradicting.	R.M.A.	Royal Marine Artillery.
K.G.F.	Knight of the Golden Fleece.	Nev.	Nevada.	R.M.L.I.	Royal Marine Light Infantry.
K.H.	" Hanover.	N.F.	Newfoundland.	R.M.S.	Royal Mail Steamer.
kilo.	Kilogramme.	N.H.	New Hampshire.	R.N.	Royal Navy.
K.L.H.	Knight of Legion of Honour.	N.J.	New Jersey.	R.S.A.	Royal Scottish Academician.
K.M.	" Malta.	N.M.	New Mexico.	R.S.E.	Royal Society of Edinburgh.
Knt. or Rt.	Knight.	N.O.	New Orleans.	R.S.L.	Royal Society of London.
K.P.	Kt. of St Patrick.	No.	Notary Public; New Providence.	R.S.M.	Royal School of Mines.
K.T.	" the Thistle.	N.P.	Notary Public; New Providence.	R.S.O.	Railway Sub-office.
L.A.	Law Agent.	N.S.	New Style; Nova Scotia.	R.S.V.P.	<i>Répondez s'il vous plaît</i> , Please reply.
L.A.	Literate in Arts.	N.S.W.	New South Wales.	R.V.	Revised Version of the Bible.
Lat.	Latin; Latitude.	N.T.	New Testament.	R.V.	Rifle Volunteers.
Lb.	<i>Libra</i> , pound.	N.W.T.	North-west Territory.	Ry.	Railway.
Lc.	Lowercase (in printing).	N.Y.	New York.	S.	South; Saint; Seconds.
Ld.	Lady Day.	N.Z.	New Zealand.	S. Am.	South America.
L.D.S.	Licentiate in Dental Surgery.	N. & Q.	Notes and Queries.	Sc.	<i>Scilicet</i> , namely.
		O.	Ohio.	Sc.	<i>Sculpit</i> , engraved (it).
		O/a	On account of.	S.C.	South Carolina.
		Ob.	Obit, died.	Sc.D.	Doctor of Science.
		O.H.G.	Old High German.	Sen.	Senator; Sculor.
		O.K.	for, All Correct.	S.J.	Society of Jesus (Order of the Jesuits).
		O/L	per cent.	S.L.	Solicitor at Law.
		O.P.	Out of print.	S.M.	<i>Sa Majesté</i> , His or Her Majesty.
				S.P.	<i>Sine prole</i> , Without offspring.
				S.P.C.A.	Society for the Prevention of Cruelty to Animals.
				S.P.C.K.	Society for Promoting Christian Knowledge.

S.P.G.	Society for the Propagation of the Gospel.	U.S.A.	United States of America ;	W.S.	Writer to the Signet (Scotland).
S.P.Q.R.	<i>Senatus Populusque Romanus</i> , The Roman senate and people.	U.S.C.	United States Army.	W.T.	Washington Territory.
Sq.	<i>Sequens</i> , the following.	U.S.N.	United States of Colombia.	W.Va.	West Virginia.
Sq.	<i>Sequentia</i> , the following (plural).	U.S.S.	United States Navy.	Wy.T.	Wyoming Territory.
S.S.	Screw steamer.	U. I.	United States Ship.	Xmas.	Christmas. The letter X has the same form as the Greek letter X (<i>chi</i>), the first letter of Christ's name.
S.S.C.	Solicitor before the Supreme Courts (Scotland).	Ut sup.	Ut <i>supra</i> , as above.	Xtian.	Christian.
S.T.P.	<i>Sacra Theologia Professor</i> , Professor of Theology.	V.	<i>Versus</i> , against.	Ye, Yt.	The, That. (This use of Y originated in the Anglo-Saxon character þ, equivalent in sound to the modern th.
Sup.	<i>Supra</i> , Above.	V.A.	Order of Victoria and Albert.	Y.M.C.A.	Young Men's Christian Association.
s.r.	<i>Sub voce</i> , under such and such a head.	V.C.	Victoria-Cross; Vice-chancellor; Vice-consul.	Y.W.C.A.	Young Women's do.
T.C.D.	Trinity College, Dublin.	V.D.M.	<i>Verbi Dei Minister</i> , Preacher of the Word of God.	Yr.	Younger.
Tenn.	Tennessee.	V.G.	Vicar-general.	Yr. and.	Et, and.
Tennp.	<i>Tempore</i> , in the time of.	Viz.	<i>Fiduciet</i> , to wit; namely.	Yr. and.	Et, and.
Tex.	Texas.	V.P.	Vice-president.	Yr. and.	Et, and.
T.O.	Telegraph Office; Turn over.	V.R.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.
U.K.	United Kingdom.	V.R.I.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.
Ult.	<i>Ultima (mensis)</i> , in the last month.	V.S.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.
U.P.	United Presbyterian.	Vt.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.
U.S.	United States; United Service.	W.I.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.
		Wis.	<i>Victoria Regina</i> , Queen Victoria.	Yr. and.	Et, and.

Abd signifies in Arabic 'slave' or 'servant,' and enters, along with the name of God, into the composition of many proper names; as Abd-Allah, 'servant of God;' Abd-el-Kader, 'servant of the mighty God,' &c. So *Ebed* in Hebrew and Syriac.

Abd-el-Kader, properly Sidi-el-Hadji-Abd-el-Kader-Uled-Mahiddin, the famous hero in the great Algerian struggle with the French, was born at Mascara in 1807. A scion of a priestly house that traced its pedigree to the califs of the lineage of Fatima, he was carefully educated, and early succeeded to the high influence held by his father among his countrymen. His public career began at the time of the conquest of Algiers by the French. No sooner was the power of the Turks broken, than the Arab tribes of the province of Oran elected him as their emir. He thus found himself the leader of the combined tribes in their attempt to check the growing power of France in Northern Africa, and began that long struggle with the French, which he waged with such marvellous perseverance and strategic skill, from 1832 to 1847. Often defeated, he appeared soon after at the head of new troops, and baffled the enemy by his marvellous rapidity. In 1834, he compelled General Desmichels to recognise his authority in a treaty, and meantime his influence spread widely among the tribes of the interior. Hostilities soon broke out again, and in June (1835) he inflicted a severe defeat on a large French army at Makta. Spite, however, of his heroism, he was crushed by overpowering force, and compelled, after a protracted struggle, to take refuge in Morocco. Here he succeeded in getting up a sort of crusade against the enemies of Islam; but Bugeaud's decisive victory at Isly in 1844, obliged the sultan of Morocco to give up the cause of Abd-el-Kader, though he could not prevent his warlike subjects from giving sympathy and some support to the brave champion of their faith. His own security soon obliged the sultan to oppose him actively, and at length Abd-el-Kader was forced, after a daring but unsuccessful attack on the Moorish camp, to retreat into the territory of Algeria, where he had to surrender to General Lamoricière, December 22, 1847. He was sent with his family to France, where he lived in honourable captivity, until liberated in 1852 by Louis Napoleon. He afterwards resided successively in Broussa in Asia Minor, Constantinople, and finally Damascus. Enjoying a French pension of 100,000 francs, he spent his leisure in the composition of a work of a religious, philosophical character, which was translated in 1858, under the title, *Rappel à l'Intelligent: Aris à l'Indifférent*. He was of great service to the cause of humanity during the Syrian massacres of 1860, and for this was decorated by Napoleon III. with

the Grand Cross of the Legion of Honour. In 1865 he visited Paris and England, and was at the Paris Exhibition in 1867. He died at Damascus, 26th May 1883.

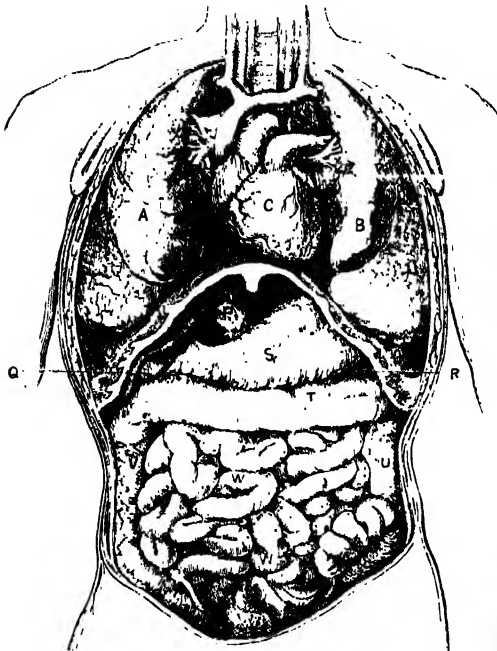
Abdera, a town which stood on the south coast of ancient Thracia, to the east of the river Nestus. Colonised by the inhabitants of Teos in 541 B.C., it afterwards came under the power of Athens, and was a free town under the Romans. Although the birthplace of such distinguished men as the philosophers Democritus, Protagoras, Anaxarchus, and the historian Hecateus, Abdera was the Gotham of antiquity, and Abderite a proverbial name for a simpleton.

Abdication, the resignation of an office, generally the office of ruler or sovereign, is rarely due to pure preference of a private station, but is generally the result of vexation and disappointment. It was from being wearied with dominion, that Diocletian abdicated (305 A.D.). Christina of Sweden retired from the throne (1654) out of preference for the freedom of private life, but wished still to exercise the rights of a sovereign. Charles V. laid down the crown (1556) chiefly from ill-health, but partly, too, because his great schemes had failed. Philip V. of Spain did so (1724) in a fit of melancholy, but resumed it on the death of his son. Louis Bonaparte resigned the crown of Holland (1810), because he would not consent to treat that country as a province of France. Charles-Emmanuel of Savoy retired from the throne in 1802, not finding himself equal to the crisis; and the same was the case with Victor-Emmanuel, in 1821. William I. of the Netherlands resigned (1840), as his policy had become impossible from the turn of affairs in Belgium. Foreign force compelled the abdication of Augustus of Poland (1704), and later, that of Stanislaus Leszczyński (1735) and of Poniatowski (1795); as well as that of Charles IV. of Spain (1808), and of Napoleon (1814 and 1815). Insurrections have been a frequent cause of abdications. In England, we have the compulsory abdication of Richard II. (1399); in Scotland, that of Mary at Lochleven (1567). Modern times have seen Charles X. (1830) and Louis-Philippe (1848) retire before the storm of revolution, without the conditions they made being regarded; have seen, too, the abdication of Ferdinand of Austria (1848), of Louis of Bavaria (1848), of Charles-Albert of Savoy (1849), of Amadeus of Spain (1873), and of Prince Alexander of Bulgaria (1886).

In some countries, the king can abdicate whenever he pleases; but in England, the constitutional relation between the crown and the nation being of the nature of a contract, the king or queen, it is considered, cannot abdicate without the consent of parliament. It is, however, said that the king does abdicate, or, to speak perhaps more correctly,

an abdication may be presumed and acted on by the people, if his conduct politically and overtly is inconsistent with, and subversive of, the system of constitutional government, of which the qualified monarchy of his office forms part. Thus, in the case of James II., it was disputed whether the king had 'abdicated' or 'deserted.' At the conference between the two Houses of Parliament previous to the passing of the statute which settled the crown on William III., it would appear that the word 'abdicated' was advisedly used instead of 'deserted'—the meaning, it is presumed, being that James had not only deserted his office, but that by his acts and deeds, of which the said desertion formed part, he had, in view of the constitution, ceased to have right to the throne. From this it may be inferred that abdication was considered to have a twofold political signification, involving maladministration as well as desertion. The Scotch Convention, however, more vigorously and distinctly resolved that King James 'had forfeited the crown, and the throne was become vacant.'

Abdomen. The trunk of the human body is divided by the diaphragm into two cavities—the upper being the thorax or chest, and the lower, the abdomen or belly. Both the cavity and the viscera



Organs of the Chest and Abdomen:

A, B, lungs; C, heart; OO, diaphragm; P, liver; Q, gall-bladder; R, spleen; S, stomach; TUV, colon; W, W, small intestines.

it contains are included in the term abdomen. It is subdivided into two parts, the *abdomen proper*, and the *pelvis*, or basin. The former contains the liver, pancreas, spleen, and kidneys, as well as the stomach, small intestine, and large intestine or colon; the latter, the lowest part of the cavity, contains the lower bowel or rectum, the urinary bladder, and internal organs of generation. The abdomen is lined by a serous membrane, the peritoneum, which is folded over the viscera, allowing them a certain freedom of movement, but keeping them in their proper relations to each other. For the purpose of making accurate reference to the position of the contained organs, the abdomen

is artificially divided externally by two horizontal lines into three principal *zones*—the upper, the middle, and the lower. These are again subdivided by two vertical lines into nine areas—the three lateral divisions upon either side being named from above downwards, the hypochondriac, lumbar, and iliac regions respectively; while the names epigastric, umbilical, and hypogastric, are applied from above downwards to the three mesial areas.

ABDOMEN, in Entomology, the posterior of the three parts into which the body of an insect is divided. See **INSECT**.

Abduction. In the older systems of law, abduction meant the unlawful taking away of a free person, or of a slave belonging to another. Thus, the buying of a free person was punishable by the criminal law of Rome under the name of *plagium*, which is still used in Scotland for the theft of children. Substantially, however, in modern times, abduction, except in the special cases of voters and witnesses, is confined to the case of women and children. In England, *Kidnapping* (q. v.) includes the theft of any person, but is more properly applied to the taking away beyond the seas—whereby the person loses the protection of his own laws. For this the technical term in Scotland is abduction. In England, abduction technically means the taking away of a woman either against her own will, or (in the case of a woman under the age of 21) against the will of her parents or guardians. The common forms of the crime are defined in the Criminal Law Consolidation Act, 1861. Where the woman is taken by force or fraud with a view to marriage or seduction, the heavy penalty of fourteen years' penal servitude may be inflicted, with the forfeiture of the husband's property rights, if marriage has taken place. The mere abduction of an unmarried girl under 16 from her parents or guardians, is punishable by two years' imprisonment; and under the Criminal Law Amendment Act, 1886, such taking of a girl under 18 with a view to seduction meets with the same punishment, provided there was no reason to suppose the girl was above 18. Under the same Act, the detention of any woman or girl *against her will* for improper purposes, meets with the same punishment; the common case being that clothes are withheld from girls who desire to leave improper houses. The abduction of a married woman is, under an old English statute, separately punishable by two years' imprisonment and fine. The abduction of children under 14 is technically known in England as child-stealing, and is punishable by fourteen years' penal servitude as a *maximum*. The mother of a child, or the father of a bastard, is in no case chargeable with the offence. Generally, the offence of abduction is more often committed by decoying and fraudulent arts than by force. In Scotland, the *plagium* is more comprehensive than the English child-stealing, as it applies to all cases of children under puberty, whatever the motive may be.

In the United States, abduction is the taking and carrying away of a child, a ward, a wife, &c. by fraud, persuasion, or open violence. Every one who takes away any female under the age of 18 years from her father, mother, guardian, or other person having the legal charge of her person, without her consent for the purpose of prostitution, is guilty of a felony. The gist of the offence is the enticing and carrying away. In abduction for the purpose of marriage, it is not necessary to use physical force or violence, nor is it any defence that the abductor really believed, or had reason to believe, the girl to be over 16. A child under the age of 14 years is incapable of giving her consent. Abduction throughout the United States is a felony, and punished by fine, in some states,

not exceeding ten thousand dollars, and by separate or solitary confinement at labour for a period not exceeding twenty-five years.

For the abduction of voters, see PARLIAMENT.

Abd-ul-Aziz, the thirty-second sultan of the Ottoman Turks, was born February 9, 1830, and succeeded his brother, Abd-ul-Medjid, in 1861. At first he showed himself liberal-minded and open to western ideas. But the promise of economy and reform was illusory, and ere long the sultan began to spend vast sums on his army, the embellishment of his capital, on hunting, and on costly journeys. Spite of this, reforms were long hoped for, especially after his visit to Western Europe in 1867. His government had great difficulties to contend with in the Cretan insurrection, the struggle of Roumania and Servia for full autonomy, and finally the outbreak of Mohammedan fanaticism. In 1871 the sultan strove to get the succession settled upon his son, instead of his nephew Murad in accordance with Turkish custom. He next entered into intrigues with Russia, and plunged ever into deeper financial difficulties, while his stupid misgovernment alienated the provinces, and led, in 1875, to risings in Bosnia, Herzegovina, and Bulgaria. At last a conspiracy forced him to dismiss his minister, and next to abdicate the throne, 30th May 1876. Four days later, the unhappy sultan was found dead, it is almost certain by foul play.

Abd-ul-Latif, a celebrated Arabian writer, was born at Bagdad in 1162. By way of education he committed to memory the Koran, the chief poets, and not a few grammatical treatises. To complete his culture he betook himself to Damascus, where the famous Saladin had gathered round him the most learned men of the time. He then settled in Egypt for some years, and taught medicine and philosophy at Cairo; he afterwards lectured at Damascus. His numerous works were mainly on medicine; but his best-known book is a valuable descriptive work on *Egypt*, translated into Latin by White (Oxford, 1800), and into French by De Sacy (1810). He died at Bagdad in 1231, on his way to Mecca.

Abd-ul-Medjid, the Grand Sultan, was born 23d April 1823, and succeeded his father, Mahmud II., in 1839. The Turkish empire was then in a very dangerous position. Its army had been defeated and dispersed by the Egyptians in the battle of Nisib, and there was nothing to hinder the victorious Ibrahim Pasha from advancing on Constantinople, where a large party were favourable to the Egyptian power under Mehemet Ali. Had it not been for the intervention of the Christian powers, the house of Osman was lost. The treaty of 1840, from which France kept aloof, obliged Mehemet Ali to submit; and the treaty of 1841, to which France subsequently adhered, settled securely the future dependent relation of Egypt to Turkey. The sultan, on the advice of Reshid Pasha, proceeded in the path of reform begun by his father, and by the famous *hatti-sherif* of November 3, 1839, promised equal protection to all his subjects irrespective of their creed. Numerous reforms followed, but many of his decrees had but little effect, as the sultan lacked energy both of body and mind. He acted a chivalrous part in 1850 in refusing, at the risk of losing his throne, to give up Kossuth and the other political refugees to the menaces of Russia and Austria, and he had a specially difficult part to play during the war with Russia (1854-56), and the diplomatic negotiations consequent to it. From this time, the sultan sunk into unworthy indolence, and allowed public affairs to drift into financial ruin, until he entirely lost the affection of his subjects. He died 25th June 1861.

Abd-ur-Rahman, sultan of Fez and Morocco, born 1778, succeeded his uncle in 1823. His first four years of rule were occupied in quelling insurrections. Next, some danger to the state of Morocco was threatened by the refusal of Austria to pay the tribute for safety against pirates; but the sultan wisely adjusted the dispute by relinquishing this sort of blackmail, formerly levied by Morocco on European ships in the Mediterranean. The religious war under Abd-el-Kader against the French in Algeria involved the sultan in its movements; but was concluded by the battle of Isly (1844), and the subsequent mediation of England. The piratical habits of his subjects brought Abd-ur-Rahman to the brink of war with more than one European state. He died in 1859. --The same name, also spelt Abd-al-Rahman and Abd-er-Rahman, is the name of the first Omniad calif of Cordova (755-788). See CALIF, OMMAIDES, also AFGHANISTAN.

Abecedarians, a small sect among the Anabaptists in Germany in the 16th century, noted for their dislike to learning. They thought it best not even to learn to read, as a knowledge of the Scriptures was all that was necessary, and this was communicated by the Holy Spirit direct to the believer without the medium of the written word.

A Becket, THOMAS. See BECKET.

A Beckett, GILBERT ABBOTT, born in London, 9th January 1811, and educated at Westminster School, in 1841 was called to the bar, in 1849 became a metropolitan police magistrate, and died at Boulogne, 30th August 1856. Besides writing for *Punch*, the *Times*, the *Morning Herald*, and the *Illustrated News*, he was author of *Quizzology of the British Drama*, *The Comic Blackstone*, and *Comic Histories of England and Rome*, the second illustrated by Cruikshank, the last two by Leech.

Abel (from the Heb. *hebel*, 'breath'), the second son of Adam, was, according to the account in Genesis, slain by his elder brother Cain, jealous because his offering had been rejected by Jehovah, and Abel's accepted. The New Testament speaks of 'righteous Abel,' and the Epistle to the Hebrews makes the acceptance of Abel's sacrifice due to his faith. The Christian Church has, in all ages, regarded Abel as a type of innocence and faith, and the Bible record has been variously supplemented by the Rabbins and by the Koran.

Abel, SIR FREDERICK AUGUSTUS, a well-known chemist, was born in London in 1827. He chiefly devoted himself to the science of explosives, expounding his discoveries and investigations in *Gun-cotton* (1866); *The Modern History of Gunpowder*; *On Explosive Agents*; *Researches in Explosives*; and *Electricity applied to Explosive Purposes* (1884). He further wrote, in conjunction with Colonel Bloxam, a *Handbook of Chemistry*. By converting blasting gelatine into a solid body, he produced a more powerful and manageable explosive. He holds the official appointments of Associate Member of the Ordnance Committee, Chemist to the War Department, and Chemical Referee to the Government. He was knighted in 1883, and the same year received the honorary degree of D.C.L. at Oxford.

Abel, KARL FRIEDRICH, a German musician, born at Koethen in 1725. He was a pupil of Sebastian Bach, and in 1758 he came to England, where ere long he was appointed chamber-musician to the queen of George III. He died in London, 22d January 1787.

Abel, NIELS HENRIK, one of the ablest and acutest mathematicians of modern times, was born at Findö, Christiansand, 5th August 1802. He became a lecturer at the university of Christiania,

and the school of engineering there. His works deal mainly with the theory of elliptical functions, which his discoveries greatly enriched. He died young, on the 6th April 1829.

Abelard (Fr. *Abélard* or *Abailard*; Lat. *Abelardus*), PETER, the keenest thinker and boldest theologian of the 12th century, was born at Pallet or Palais, near Nantes, in 1079. Resigning his prospects as eldest son of a noble Breton house, he chose the career of a scholar. During the wanderings of his studenthood, he heard Roscellin, the champion of extreme Nominalism (q.v.), and was a pupil of William of Champeaux, one of the foremost of the Realist teachers. His singular gifts as a dialectician soon enabled him to encounter his master in debate, and he speedily met with brilliant success as a scholastic lecturer. In or about 1115 he became William's successor in the school of Notre-Dame; and for a few years he enjoyed a repute and influence such as few teachers have ever had. Amongst the pupils his teaching helped to mould were not a few of the greatest men of the age: Pope Celestine II., Peter Lombard, Berengar, and Arnold of Brescia. But Abelard's fall from prosperity and power was sudden and rapid. Within the precincts of Notre-Dame lived Héloïse, the niece of the canon Fulbert, then seventeen years of age, and already remarkable for her beauty and accomplishments. She soon kindled in the breast of Abelard, then thirty-eight years old, an overwhelming passion, which was returned by Héloïse with no less fervour. By the uncle's choice, Abelard became Héloïse's tutor and an inmate of the same house, and the lovers were happy together until Abelard's glowing love songs reached the ears of the canon. He sought to separate the lovers; but it was too late. They fled together to Brittany, where Héloïse bore a son, and was privately married to Abelard with the consent of her uncle. Not long after, Héloïse returned to Fulbert's house, and with singular self-devotion denied the marriage, that her love might be no hindrance to Abelard's advancement in the church. When shortly after Héloïse fled to the convent of Argenteuil, Fulbert, enraged at her husband's connivance, caused him to be brutally mutilated, so that he might be made canonically incapable of ecclesiastical preferment. In deep humiliation, Abelard entered the abbey of St Denis as monk; Héloïse took the veil at Argenteuil. Ere long a synod at Soissons (1121) condemned his teaching on the Trinity as heretical, and ordered him to be confined for a time.

In the hermit's hut at Nogent-sur-Seine, to which he retired, Abelard was soon again besieged by importunate disciples; the hermitage became a monastic school known as Paraclete, which, when Abelard was invited to become abbot of St Gildas-de-Rhuys in Brittany, was given to Héloïse and a sisterhood under her care. In his abbey Abelard maintained for ten years a struggle with disorderly and unfriendly monks, and at last fled from the hopeless task. Freed from his charge by the pope, he now devoted himself to the revision of all his works. When he ventured again to appear in public as a teacher, his theological adversaries, headed by Bernard of Clairvaux (q.v.), accused him of numerous heresies, of which he was found guilty by a council at Sens and by the pope. On his way to Rome to defend himself he died, reconciled ere death to his opponents, and absolved by the pope, at the priory of St Marcel, near Chalon, 21st April 1142. His remains were given into the keeping of Héloïse, whose own were twenty years afterwards laid beside them. From Paraclete, the ashes of both were taken to Paris in 1800, and in 1817 were buried in one sepulchre at Père la Chaise, where still they lie.—Abelard

did more than any other to develop and fix that method of joint philosophising and theologising which was characteristic of the great Scholastics (q.v.); it was Abelard who made Aristotle the almost exclusive basis of theological dialectics. In the question of the universals (see NOMINALISM), he took a place between the extreme Nominalists and the thoroughgoing Realists. In opposition not merely to the unreasoning devotion of Bernard and the mystics, but as against the systematic dogmatism of Anselm, he taught that only that faith is well assured which is founded on reason. 'Understand that thou mayest believe' was his motto, not 'Believe that thou mayest understand.' His ethical system he set down in the work *Næve teipsum*. *Sic et Non* is a curious collection of direct contradictions on various important points gathered from the works of the Fathers. See monographs by Rémusat (Paris, 1845), Wilkens (Göttingen, 1855), and Deutsch (Leip. 1883). The story of his life forms the subject of a remarkable drama by Rémusat; and the still extant correspondence between Abelard and Héloïse suggested to Pope his *Epistle of Eloïsa to Abelard*. The best collective edition of Abelard's works is by Cousin (2 vols. 1849-59).

Abel. See POPULAR.

Abelmuschus. See HIMESUS.

Abencerrages, a noble Moorish family which came to Spain in the 8th century, and were named from Jusuf ben Serragh. Their struggles with the family of the Zegris, and tragical destruction in the royal palace of the Alhambra, in Granada, in the time of Abu Hassan (1466-84), the last but one of the kings of Granada, furnish the materials for the legend, probably unhistorical, found in Perez de Hita's *Historia de las Guerras Civiles de Granada* (1694). On this Chateaubriand based his romance, *Les Aventures du dernier des Abencerrages*, which furnished Cherubini with the text of an opera.

Aben-Ezra, properly Abraham-Ben-Meir-Ben-Ezra, born 1093 at Toledo, died 1168 in Rome, was one of the most learned Jews of his time, distinguished for his knowledge of philosophy, mathematics, astronomy, and medicine. He visited France, Egypt, and England, and passed the later years of his life in Rome; everywhere giving lectures on grammar, theology, and astronomy. He left treatises on astrology and some poems; but his most important works are his Commentaries on the Old Testament.

Aber is a Celtic word which enters into the composition of several names of places, chiefly in Wales and Scotland. It indicates the mouth or embouchure of a stream, either into the sea, or into another river—as Aberbrothock, at the mouth of the Brothock, in Forfarshire; Abergavenny, at the junction of the Usk and Gavenny, in Wales.

Aberavon, or PORT TALBOT, a parliamentary and municipal borough and seaport, in Glamorgan, on the Avon, near its mouth in Swansea Bay, 32 miles W. of Cardiff. The valley of the Avon is shut in by lofty hills, while every available space is occupied by copper and iron works. Hence comes the metal of which our copper coinage is made. The town has a good harbour and docks. For parliamentary purposes, Aberavon is one of the Swansea boroughs. Pop. of municipal borough (1881) 4875.

Abercorn, a Linlithgowshire hamlet, near the Firth of Forth, and 3½ miles W. of South Queensferry. Here stood the monastery of Aebbercornig, or Eoricorn, which, founded about 675, was from 681 to 685 the seat of a bishopric, the earliest in Scotland. For the ducal title of Abercorn, see HAMILTON.

Abercrombie, JOHN, in his day the most eminent of Scottish physicians, was born in 1780, at Aberdeen, where his father was a parish minister. He studied medicine in Edinburgh, taking his degree in 1803, and thenceforth devoted himself to the practice of his profession in the Scottish capital. At a comparatively early age, he attained a high reputation; and after the death (in 1821) of the celebrated Dr Gregory, he became recognised as the first consulting physician in Scotland. His principal professional writings were treatises on the pathology of the brain and on diseases of the stomach. But he is best known by his works on *The Intellectual Powers* (1830) and *The Moral Feelings* (1833). These works have no pretensions to originality or depth of thought, but immediately acquired a remarkable popularity, and attained respectively an 18th and 14th edition. Dr Abercrombie died suddenly, November 14, 1844.

Abercromby, SIR RALPH, was born at Menstrie, Clackmannanshire, 7th October 1734. Destined for the Scottish bar, he was educated at Rugby, and then from 1752 to 1755 studied law at Edinburgh and Leipzig. His natural inclination, however, pointed to a military life; and having in 1756 obtained a cornetcy in the 3d Dragoon Guards, he two years later saw some active service in the Seven Years' War. From 1774 to 1780 he represented Clackmannanshire in parliament; and in 1780 raised a regiment in Ireland, the 103d, or King's Irish. In 1793 he accompanied the Duke of York to Holland. His conduct throughout that unfortunate campaign, especially during the disastrous retreat in the winter of 1794-5, won him the love and admiration of the whole army. On his return to England, he was made a Knight of the Bath, and was appointed to the chief command of the West Indies Expedition, which he conducted with distinguished success. In 1797 he was sent to command the forces in Ireland; but his enlightened and manly remonstrances against the policy of government towards that country occasioned his removal to a similar command in Scotland. In 1799 he was second in command to the Duke of York in the other unhappy expedition to Holland. On his return, he received the command of the expedition to the Mediterranean. The fleet anchored in Aboukir Bay on 2d March 1801; and before mid-day of the 8th, the British troops were in possession of the sand-hills which command the shore, having landed in the face of a storm of shot. On the morning of the 21st, Menon, the French commander, attempted to surprise the British camp. He found them ready, under arms. In the glorious action that ensued, Abercromby was struck by a musket-ball in the thigh; but not till the battle was won did he show any sign of pain. The ball could not be extracted; mortification ensued; and on the 28th he died on board the flag-ship. He was buried at Malta, and a monument was erected to him in St Paul's. The peerage conferred on his widow was afterwards enjoyed by his eldest son, with the title of Baron Abercromby. —His third son, JAMES (1776-1838), entered parliament in 1807, held the office of Speaker (1835-39), and was then created Baron Dunfermline. He was author of a Memoir of the last eight years of his father's life (1861).

Aberdare, a town of Glamorganshire, 4 miles SW. of Merthyr-Tydvil. Coal and iron are found in abundance in the vicinity, coal being largely exported. Aberdare, which is connected with the coast both by rail and canal, is a flourishing centre of iron and tin works. The town has kept pace with the development of its industries; it has many substantial buildings, is well supplied with water, and possesses a public park. The

place, which is within the parliamentary borough of Merthyr-Tydvil, has grown very rapidly. Pop. (1841) 6471; (1861) 32,299; (1881) 33,804.

Aberdare, LORD. Henry Austin Bruce was born at Duffryn, in Glamorganshire, in 1815. He was called to the bar in 1837, and in 1852 was returned by Merthyr-Tydvil to the House of Commons as a Liberal. He was Home Secretary under Gladstone in 1868, and carried an important licensing act; raised to the peerage as Lord Aberdare in 1873, he became Lord President of the Council. He was elected President of the Royal Geographical Society in 1880.

Aberdeen, the chief city and seaport in the north of Scotland, lies in the SE. angle of the county, at the mouth and on the north side of the river Dee, 111 miles N. of Edinburgh. William the Lion confirmed its privileges in 1179; the English burned it in 1336, but it was soon rebuilt, and called New Aberdeen. Old Aberdeen, within the same parliamentary boundary, is a small town a mile to the N., near the mouth of the Don, and is the seat of St Machar's Cathedral (1357-1527), now represented by the granite nave, which, as restored since 1869, is used as a parish church. King's College and University, founded by Bishop Elphinstone in Old Aberdeen in 1494, and Marischal College and University, founded by the Earl Marischal in New Aberdeen in 1593, were in 1860 united into one institution, the University of Aberdeen. It has 23 professors and from 800 to 900 students in its four faculties of arts, divinity, law, and medicine; with Glasgow University it sends one member to parliament. Marischal College was rebuilt in 1841; whilst King's College is a stately fabric, dating from 1500, its chapel adorned with exquisite wood carvings. In the 17th century, Aberdeen had become an important place, but it suffered much from both parties in the civil wars. It has a flourishing trade and thriving manufactures; and having been largely rebuilt and extended since the formation of Union Street in 1800, the 'Granite City' now offers a handsome and regular aspect. Among the chief public edifices are the County Buildings (1867-73), the Post-office (1876), the Market-hall (1842; rebuilt after the fire of 1882), the Trades-hall (1847), the Royal Infirmary (1740; rebuilt 1840), the Lunatic Asylum (1819), the Grammar-school (1863), the Art Gallery and Art School (1882-83), and Gordon's College (1739-1834). The last has been much extended as a technical school, the foundationers being no longer resident; whilst the Infirmary was reconstructed and modernised to celebrate the Queen's Jubilee (1887). Of more than 60 places of worship, the only one of much interest is the ancient church of St Nicholas, now divided into the East and West churches, and having a fine new spire (1880), 190 feet high. A fine carillon of 37 bells was placed here in 1887. One may also notice the market-cross (1686); the Wallace, Gordon Pasha, and three other statues; and the Duthie Public Park of 47 acres (1883). Since 1810, when the debt upon the harbour was £29,614, the harbour revenue collected up to 1887 was £1,893,806; and the expenditure on harbour improvements was £1,063,475, the works having included the formation of the Victoria Dock (1848), a breakwater, the southward diversion of the Dee (1872), and a graving-dock (1886). The trade of the port has largely increased since 1850; and the aggregate tonnage of vessels entering in good years exceeds 600,000 tons. Railway communication has also been fully established since 1848-54. The chief exports are woollens, linens, cotton-yarns, paper, combs, granite (hewn and polished), cattle, grain, preserved provisions, and fish. Aberdeen has the largest comb and granite-

polishing works in the kingdom. There are also several large paper-works within a short distance of the town. Wooden shipbuilding was formerly a prosperous industry, the Aberdeen clipper-bow ships being celebrated as fast sailers; but since 1860 they have been gradually superseded by iron or steel steamships; and, owing to Aberdeen's remoteness from coal and iron, its shipbuilding now is greatly contracted. Connected with Aberdeen, which has always been a celebrated seat of learning, have been the names of Barbour, Boece, Jameson, Gregory, Reid, Beattie, Campbell, Byron, Skinner, Hill Burton, W. Dyce, J. Phillip, and Sir A. Anderson, to whose provostship (1859-66) belong the introduction of a fine water-supply, and many other improvements. Pop. of the parliamentary burgh, which since 1885 has returned two members, (1801) 26,992; (1841) 63,288; (1881) 105,003; (1887) about 120,000.

Aberdeenshire, a large maritime county in the extreme N.E. of Scotland. The fifth in size of the Scottish counties, it has a maximum length of 85 and breadth of 47 miles, with 62 miles of sea-coast, and an area of 1971 square miles. It has long been popularly divided into five districts (proceeding from south-west to north-east)—Mar, Strathbogie, Garioch, Formartine, and Buchan. Aberdeenshire is generally hilly, and in the south-west (Braemar) entirely mountainous, the Grampians running along the south side, and branching off to the north-east and north. The loftiest summits here are Ben Muich-Dhui (next to Ben Nevis, the highest hill in the British Isles), 4296 feet; Cairntoul, 4241; Cairngorm, 4084; Benabour, 3924; Lochnagar, 3786; whilst northward rise Bennachie, 1698; the Buck of Cabrach, 2368; and Mormond Hill, 733. The predominant rocks are granite and gneiss. The granite is very durable, and is much used for building and polishing. The chief rivers are the Dee (87 miles long), Don (82 miles), and Ythan (35 miles), which run eastward into the North Sea; and the Deveron (61 miles), which runs north-east into the North Sea. The Ythan yields the pearl-mussel, but rarely pearls of any value. Clay soils predominate near the coast, loamy soils near the centre, and poor, gravelly, sandy, and peaty soils elsewhere. The most fertile parts lie between the Don and Ythan, and in the north-east angle of the county. Nowhere in the kingdom have the natural disadvantages of soil and climate been more successfully overcome. The chief towns and villages are Aberdeen, Peterhead, Fraserburgh, Huntly, Kintore, Inverurie, Turriff, Ballater, and Castleton. The county returns two members to parliament; the city of Aberdeen, two; and the burghs of Peterhead, Kintore, and Inverurie, with Elgin, Cullen, and Banff, one. About 37 per cent. of the area of Aberdeenshire is cultivated, the chief crops being oats, barley, and turnips; whilst nearly 8 per cent. is under wood. A speciality of its agriculture is the exceptionally large proportion of small holdings. Aberdeenshire produces one-seventh of the cattle reared in Scotland, and is unsurpassed in breeding and feeding stock. Its principal breed is the Polled Angus. The fisheries on the coast are very productive, and Peterhead is the East Coast centre of this industry. The munificent Dick and Milne bequests for parochial schoolmasters early gave Aberdeenshire a high place in the statistics of education. Balmoral (q. v.) is the principal mansion; and amongst the antiquities are the ruins of Kildrummy Castle and the Abbey of Deer. Pop. (1801) 121,065; (1841) 192,387; (1881) 267,990. See A. Smith's *New History of Aberdeenshire* (2 vols. 1875), and the publications of the Spalding Club (1841-71; 1887 *et seq.*).

Aberdeen, GEORGE HAMILTON GORDON, EARL OF, was born at Edinburgh, 28th January 1784. He was educated at Harrow and at St John's College, Cambridge, where he took his M.A. in 1804. Before this, on succeeding to the earldom in 1801, he made a tour through Greece; hence Byron's well-known line: 'The travelledthane, Athenian Aberdeen.' In 1806 he was elected one of the Scotch representative peers, and entered the House of Lords as a Tory. In 1813 he was appointed ambassador to the Austrian court, and conducted the negotiations which led to the alliance of that power with Britain. At this time he formed the close friendship with Prince Metternich which so decidedly influenced his subsequent policy as a statesman. On the conclusion of the war, he was raised to the British peerage as Viscount Gordon. In 1828 he took office in the new Wellington ministry. The general principle which guided his policy, as Foreign Secretary, was that of non-interference in the internal affairs of foreign states, which, joined to his well-known sympathy with such statesmen as Metternich, exposed him—not always justly—to the suspicion of hostility to the cause of popular liberty. His gradual abandonment of high Tory principles was evinced by his support of the repeal of the Test and Corporation Acts, and of the Catholic Emancipation Act. For eleven years after the fall of the Wellington ministry he remained out of office, with the exception of his brief administration of the Colonial Office in the Tory government of 1834-5. In 1841 he again became Foreign Secretary, his chief services as such being the conclusion of the Chinese war, the Ashburton Treaty, and the Oregon Treaty. M. Guizot was at that time foreign minister in France, and the two statesmen acted in cordial alliance. Lord Aberdeen's Act, in 1843, for removing doubts regarding the admission of ministers to benefices in Scotland, could not heal the Disruption, and was virtually repealed by the Act for the Abolition of Patronage, 1874. Like Peel, he was honestly converted to free-trade principles, and with Peel he resigned in 1846, immediately after the repeal of the Corn Laws. In 1852, on the resignation of Lord Derby, the state of parties necessitated a coalition, and Lord Aberdeen was selected as the fittest man to head the new ministry, which for some time was extremely popular. The feeble and vacillating policy displayed in the conduct of the Crimean war gradually undermined its stability, and the gross mismanagement of the commissariat in the winter of 1854 filled up the measure of the popular discontent. Mr Roebuck's motion, calling for inquiry, was carried by a strong majority; and on 1st February 1855, Lord Aberdeen resigned office. He was author of an *Essay on Grecian Architecture* (1822). He died in London, 13th December 1860.

Aberdevine. See SISKIN.

Aberfeldy, a pleasant village of Perthshire, near the S. bank of the Tay, and 32½ miles N.W. of Perth by rail. The neighbouring Falls of Moness are celebrated in Burns's *Birks of Aberfeldy*. The embodiment of the Black Watch here in 1740, was in 1887 commemorated by a monument. Pop. 1260.

Abergavenny (the Roman *Gobannium*), a market-town of Monmouthshire, at the influx of the Gavenny to the Usk, 13 miles W. of Monmouth. It has remains of an old castle and of a priory. There are collieries and iron-works in the neighbourhood. Pop. (1881) 7285.

Abergeldie Castle, the Aberdeenshire seat of the Prince of Wales, on the Dee's right bank, 6 miles W. of Ballater, and 2 ENE. of Balmoral.

Abernethy, a small police-burgh of Perthshire, near the Egn's influx to the Tay, 8½ miles SE. of

Perth. The ancient capital of the Picts, and from 865 till 908 the seat of the sole Scottish bishopric, it retains one of the two Round Towers (q.v.) in Scotland, 73 feet high. Pop. 906.

Abernethy, JOHN, an eminent English surgeon, was born in London, 3d April 1764. His grandfather, the Rev. John Abernethy (1680-1740), an Irish Presbyterian clergyman, acquired distinction by his controversial writings. Abernethy was educated at Wolverhampton grammar-school, and in 1779 was apprenticed to the assistant-surgeon at St Bartholomew's Hospital. In 1787 he was himself elected assistant-surgeon to St Bartholomew's, and soon after began to lecture on anatomy and surgery. At first, he manifested extraordinary diffidence, but his power soon developed itself; and his lectures at last attracted crowds. His clear, simple, positive style, illustrated by an inexhaustible fund of apt anecdotes, made him the most popular medical teacher of his day. In 1813 he was appointed surgeon to Christ's Hospital, in 1814 Professor of Anatomy and Surgery to the College of Surgeons, and in 1815 full surgeon to St Bartholomew's, a post which he resigned in 1829. His practice increased with his celebrity, which the eccentricity and rudeness of his manners contributed to heighten. He died at Enfield, 28th April 1831. Of his Works (4 vols. 1830) the most original and important is his *Observations on the Constitutional Origin and Treatment of Local Diseases* (1809), in which a simple principle, till then little attended to, was made the foundation of much important and ingenious observation. See his Life by George Macilwain (3d. ed. 2 vols. 1857).

Aberration of Light is an apparent alteration in the place of a star, arising from the motion of the earth in its orbit, combined with the progressive passage of light. When rain is falling perpendicularly, a drop entering at the top of an upright tube at rest, will go through; but if the tube be carried forward horizontally, a drop entering the top will strike against the side before it goes far: to make the drop go through the tube in motion, we must incline the top of it forward in the direction of the motion. The amount of this inclination will be the greater, the more rapid the motion of the tube is compared with that of the falling drops. If in the time that a drop takes to fall through the height, AB, of the parallelogram in the annexed cut, the inclined tube, BC', is moved horizontally over a space equal to its breadth AC, a drop entering the top of the tube will descend without touching the sides. For in half the time, the tube will be in the position B'C', and the drop in the position d; and so for any other portion of the time. This exactly illustrates the astronomical phenomenon in question. The tube



is a telescope directed to receive the light of a star; this tube, and the person looking through it, are moving along with the earth in its orbit, and the light may be conceived as particles coming from the star like drops of rain, moving much faster no doubt, still requiring time. That a particle or ray of light from the star may pass through the tube, it must be directed, not straight to the star, but at a slight angle in the direction of the earth's motion. Thus the place where we see the star is not its true place. As the earth's motion, however, is slow compared with the velocity of light, the angle of inclination is small—never exceeding about 20". The result is, that, if we conceive the true place of

a star as a fixed point, the apparent place of the star describes about this true place, in the course of a year, an ellipse whose greater axis is about 41". In the case of stars near the pole of the ecliptic, this ellipse approaches to a circle, while for stars in the plane of the ecliptic, it contracts to a line about 41" long. The aberration of light was discovered by the English astronomer Bradley in 1727, while seeking to determine the parallax of certain fixed stars.

Aberystwith, a seaport and municipal borough of Cardiganshire, on the Ystwith, at its mouth in Cardigan Bay, 214 miles NW. of London by rail. It is the seat of the University College of Wales (1872), with a principal and staff of ten professors or lecturers. The building was partly destroyed by fire in 1883, and was restored in 1887 at a cost of £17,900. There are remains of a castle (1109). Its fine situation and climate combine with its marine terrace and promenade pier to make Aberystwith a favourite bathing-place. Till 1885 it was one of the Cardigan parliamentary boroughs. Pop. (1881) 7088.

Abeysance, an English law term importing that a hereditament, dignity, or office is not vested in any one, but is suspended, until the true owner appears, or the right thereto is determined. Titles of honour are said to be in abeyance when there is for a time no person entitled to them, as when an earl dies, leaving only daughters. So, when a parson dies, the life-interest, or freehold, of the glebe is in abeyance until his successor is appointed. The abstract right of property in the glebe is in perpetual abeyance, because no existing parson is ever entitled to more than the life interest.

In the United States, personal property may be in a state of legal sequestration or abeyance. A parsonage, a vessel captured at sea, until condemned as a prize, may be in abeyance. The remainder or reversion in fee, where there is a tenant of the freehold, may for a time be said to be in abeyance, when without any particular owner. The right of a citizen to vote may be held in abeyance, when he is not allowed to exercise that right.

Abgar is the name or title of twenty-eight princes of Edessa (q.v.) in Mesopotamia. The most notable of these princes is the fourteenth of the name, a contemporary of Jesus, and was said to have written a letter to Jesus, and to have received an answer from him. These letters, translated into Greek from the Syriac by Eusebius of Caesarea, were denounced as spurious by Pope Gelasius in 494, and soon lost all credit. The letter from Abgar contains a request that Jesus should visit him, and heal him of a certain disease. In the reply, Jesus is represented as promising to send a disciple to heal him after his ascension. For other fables in this connection, see Lipsius, *Die Edessanische Abgarsage* (1880).

Abhorers, the name of the court party in the reign of Charles II. (afterwards *Tories*) who abhorred the views of the *addressers*, or opponents of the royal prerogative.

Abiathar, a Hebrew high-priest in the time of David. For his share in Adonijah's rebellion, he was deprived of the priestly office, and banished by Solomon from Jerusalem.

Abich, WILHELM HERMANN, geologist and traveller, was born at Berlin, December 11, 1806. He studied at Berlin, became professor at Dorpat in 1842, Fellow of the St Petersburg Academy in 1853, and after 1877 lived at Vienna. He explored the Caucasus region, the Armenian highlands, and Northern Persia, and his published works are invaluable geological and meteorological memoirs on these countries. He died 2d July 1886.

Abies. See **FIR**.

Abigail, wife of Nabal, a wealthy chief at Carmel, who refused common hospitality to David when an outlaw from the court of Saul. David was on his way to punish Nabal for his churlishness, when Abigail hastened to meet him with a present, and so charmed him, that, on the death of her husband soon after, he at once took her to wife (see 1 Sam. xxv.).—The name *Abigail* has passed into a general name for a waiting-maid or lady's-maid, from the title of 'handmaid' applied to herself by Abigail in her address to David.

Abimelech. (1) a Philistine king at Gerar, who took to his harem Sarah, whom Abraham had, for safety's sake, represented as his sister instead of his wife, but restored her in consequence of a divine command given him in a dream. See the story in Gen. xx.—(2) A son of the Hebrew judge Gideon by a Shechemite mother, who made himself king of Shechem, first murdering all his seventy brethren except the youngest, Jotham. After a reign of three years, he was wounded to death by a stone thrown by a woman while he was besieging the tower of Thebez, held by his insurgent subjects (Judges, ix.).

Abingdon, a municipal borough of Berkshire, situated at the junction of the Ock and the Thames, 6 miles S. of Oxford, and 60 WNW. of London. 'Abbaddun' (Abbot's town) was an important place in the 8th century, and its Benedictine abbey, rebuilt in 955, was very rich. Two of its churches are old; and there are numerous charitable institutions. Its school, founded in 1563, was rebuilt in 1870. A large clothing manufactory employs many hands. Till 1885 Abingdon returned a member to parliament. Pop. (1881) 6608.

Abiogenesis (Gr. *a*, 'without,' and *bios*, 'life'), a term applied by Huxley in 1870 to the origin of living forms from non-living matter. There is no experimental evidence to show that in the world around us there is ever any exception to the general statement, *omne vivum e vitro*. A contrary belief was indeed prevalent until the end of the 17th century, but this was mainly based on the results of incomplete observation. The views of modern naturalists in regard to the origin of living matter or protoplasm are discussed elsewhere. See **LIFE**, **PROTOPLASM**, **SPONTANEOUS GENERATION**.

Abipones, formerly a powerful and warlike tribe of South American Indians, inhabiting the La Plata region, who were very formidable enemies to the Spaniards from their 'obstinate bravery.' They are now almost entirely incorporated with other tribes.

Abjuration. The oath of abjuration was imposed in 1701 upon members of parliament and all holders of public offices, including clergymen, teachers, barristers, solicitors, &c. It was a declaration in favour of King William and the Revolution Settlement, and against the 'late King James,' and concluded with the words, 'upon the true faith of a Christian.' The form of oath was altered in 1714, when the first Pretender had assumed the title of James III. and VIII.; and the scruples felt in Scotland, as to whether the oath was consistent with the Treaty of Union, were removed by statute. It was also at this time imposed on voters in Scottish elections. After special provision had been made for the case of Catholics, and of Quakers and other persons whose conscience prevented them from taking an oath, the oath of abjuration was remodelled in 1858, one form being substituted for the separate oaths of abjuration, supremacy, and allegiance, parliament taking power to omit the reference to Christianity in the

case of members of the Jewish religion entering parliament. The new form was just a declaration of allegiance to the Queen, a promise to support the Protestant succession, and a denial of the authority of foreign princes and prelates. The matter was afterwards separately dealt with in the Clerical Subscription Act, 1865; the Parliamentary Oaths Act, 1866; and the Offices and Oaths Act, 1867; but the law was consolidated by the Promissory Oaths Act, 1868. By this statute, a short oath of true allegiance, usable by Catholics and Jews, is substituted for the old oaths of abjuration, supremacy, and allegiance; an official oath of true service is provided for public officers other than judges; and a judicial oath of true service, and to do right without fear or favour, is provided for the judges. All these oaths conclude, 'so help me God;' which words, in the case of the oath of allegiance now taken by members of parliament, gave rise to the famous Bradlaugh case. The result of this case is that penalties can be recovered from every member who, though he took the oath, can be proved to a jury to have no religious belief. See **ALIEN**, **ALLEGIANCE**, **CATHOLIC EMANCIPATION**, **JEWS**, **OATH**, **PARLIAMENT**.

Abkhasia, or **ABASIA**, a district of Asiatic Russia, between the Caucasus and the Black Sea, with Mingrelia to the SE., belonging for administrative purposes to the Sukhum district. It is mountainous, with deep, well-watered, and fertile valleys. The inhabitants, who numbered at the outbreak of the Turkish war of 1878 about 30,000, are now less than half as numerous. At that time thousands emigrated to the districts that continued under Turkish rule. The country has been ruled in turn by the Romans, Persians, Georgians, and Turks. Russia gained possession of the fortresses of Abkhasia in 1824, but finally subdued the people only in 1864. See **CAUCASUS**.

Ablution. See **PURIFICATION**.

Abner, a famous Hebrew captain, cousin of King Saul. He fought bravely in the long struggle with the Philistines, and after Saul's defeat and death at Mount Gilboa, saved the crown for his son, Ishbosheth. At last, resenting a charge made against him by his master, he went over to David; but he was soon after murdered by Joab.

Abo (pronounced *Obo*), the chief town of a government in Finland, situated on the river Aurajoki, near its embouchure in the Gulf of Bothnia, 170 miles WNW. of Helsingfors by rail. It has an active trade, and exports timber, and bar and cast iron. Its university was transferred to Helsingfors after the great fire of 1827. A peace between Sweden and Russia was signed here in 1743. Pop. (1885) 25,181. The government of Abo-Björneborg has an area of 9330 sq. m., and a pop. of (1885) 363,234, of whom about 17 per cent. are Swedes.

Abolitionists, a term used to designate a party in the United States, who sought the immediate and total abolition of slavery, and who began to become politically important about the close of the 18th century. Abolitionist views had long been held by many, especially by members of the Society of Friends; but the term was not commonly used until an aggressive party spread from New England throughout the north and west, demanding immediate and unconditional emancipation. After about thirty years of agitation, the abolitionists became sufficiently powerful to get some of their doctrines adopted by the republican party. Their ends were gained when, under Lincoln's administration, slavery was abolished, 1863-5. See **GARRISON**, **SLAVERY**.

Abomey. See **DAHOMÉY**.

Aborigines (Lat.), properly the earliest inhabitants of a country. The corresponding term used by the Greeks was *Autochthōnēs*. The Roman and Greek historians, however, apply the name Aborigines to a special people, who, according to tradition, had their original seats in the mountains about Reate; but, being driven out by the Sabines, descended into Latium, and in conjunction with a tribe of Pelasgi, subdued or expelled thence the Siculi, and occupied the country. The Aborigines then disappear as a distinct people, they and their allies the Pelasgi having taken the name of Latini. The non-Pelasgic element of the Roman population is supposed to represent these Aborigines, who would thus belong to the Oscans or Ausonians. The name is applied generally to the original or native inhabitants of a country as opposed to an intrusive conquering race, or to colonists and their descendants. An Aborigines Protection Society was founded in 1838, to take all possible means for protecting the natives of various countries from murder and ill-usage generally at the hands of colonists and other white men.

Abortion is the term used in Medicine to denote the expulsion of the product of conception (the impregnated ovum) from the womb before the sixth month of pregnancy. If the expulsion takes place after that date, and before the proper time, it is termed a *premature labour* or *miscarriage*. In law, no such distinction is made. The frequency of abortion as compared with normal pregnancy is very differently estimated by different writers; but the best evidence leads us to the belief that abortion is of far more common occurrence than is generally supposed, and that it takes place on an average in one out of every three or four cases of pregnancy. The following are amongst the *causes prelo*, posing to this accident: (1) A diseased condition of either parent, and especially a syphilitic taint. (2) Most fevers, and many other acute diseases occurring during pregnancy. (3) Any condition interfering with the health of the mother, e.g., the constant breathing of impure air, insufficient nourishment, night-labour, &c. (4) A peculiar temperament on the part of the mother. Amongst the *direct causes* of abortion may be placed blows on the abdomen, falls, any violent muscular efforts, too long a walk or ride on horseback (indeed, women with a tendency to abort should avoid horseback during pregnancy), a severe mental shock, &c. Moreover, the death of the fetus from any cause is sure to occasion abortion.

Symptoms.—Abortion is sometimes preceded by feverishness, shiverings, a feeling of weight in the abdomen, or other discomfort. But the first certain indication of threatened abortion is usually hemorrhage, followed, if not arrested, by pain, which after the second month more or less resembles the pain attending normal labour.

In the *treatment* of abortion, prophylactics (or the guarding against causes likely to lead to it) hold the first place. Women liable to this affection should, on the slightest threatening, assume as much as possible the horizontal position, avoiding all bodily exertion or mental excitement. They should use non-stimulating foods and drinks, and keep the bowels open by gentle aperients such as manna and castor-oil, and carefully avoid aloes and other medicines irritating the lower bowel. Moreover, a separate bedroom must be insisted on by the physician. We shall only enter into the curative treatment so far as to state that if it is deemed necessary to check hemorrhage before professional aid can be called in, cloths soaked in cold water may be applied to the loins (care being taken to change them before they grow warm), and iced water containing an astringent, such as a little alum, may be

given internally. Further proceedings must be left to the medical attendant. At least as much attention must be paid to rest subsequently as after a normal labour; for abortion, if not very carefully attended to, is one of the most frequent causes of uterine disease.

There are occasional cases (as where the outlet of the pelvis is very contracted) in which it is necessary to induce abortion by professional means, but it would be out of place to enter into this subject in these pages. It cannot be too generally known, that all attempts at procuring criminal abortion, either by the administration of powerful drugs, or the application of instruments, are accompanied with extreme danger to the pregnant woman.

CRIMINAL ABORTION. Neither in the law of England nor of Scotland is it murder to kill a child in the mother's womb (although it would be murder of the mother, if she died in consequence of the treatment). Such a crime is called criminal abortion, and in England is defined by statute as the administering to a woman any medicine, poison, or noxious drug, or of using any surgical instrument or other means, with the intent of procuring miscarriage, whether the woman be pregnant or not. A pregnant woman may commit this crime on herself. In Scotland, procuring abortion is a crime at common law, and in both countries it is punished by penal servitude or imprisonment, according to circumstances. There is a regular trade in abortion, mechanical violence being most often employed to produce the effect. The drugs used are divided into the class of emmenagogues and that of echolies; ergot of rye being the most popular. There are many predisposing causes to abortion, both in the mother and in the fetus, which must be allowed for. In some countries, abortion is undoubtedly practised in what is called respectable society, but the medical profession have properly discouraged it.

In the United States, abortion is a felony, and severely punished by fine and imprisonment. It is a misdemeanour for any person knowingly to deposit for mailing or delivery any article or thing designed or intended to procure abortion. Even for a publisher knowingly to deposit in the mail a newspaper containing a quack medical advertisement, giving information how and where articles for producing abortion could be obtained, however vaguely the advertisement may be expressed, is by act of congress a misdemeanour (Rev. Stat. 3803). Although to procure abortion with consent of the woman is not indictable at common law, it is a felony, and punished with severe penalties.

Aboukir is a small village on the coast of Egypt, 13 miles N.E. of Alexandria. This bay is celebrated on account of Nelson's great victory over the French fleet, August 1, 1798, the famous 'Battle of the Nile.' The French fleet was not merely defeated, but almost annihilated; the flagship of the admiral De Brueys blew up, and only two ships escaped. Here Napoleon in 1799 defeated a Turkish army; and here Sir Ralph Abercromby's expedition landed in 1801 in the face of the enemy.

Abousambul. See ABUSIMBEL.

About, EDMOND FRANÇOIS VALENTIN, an eminent French author, was born at Dienze, in Lorraine, February 14, 1828. After a brilliant course at the Lycée Charlemagne and École Normale in Paris, he went for two years to study archaeology at Athens, and on his return about the end of 1853, he published *La Grèce contemporaine*, a clever popular satire on modern Greek society. Its success opened to the young author the columns of the Paris journals, and in the *Revue des Deux Mondes* ere long appeared his first novel, *Tolia Feradli*, republished

in 1855. About was accused of having taken many of the incidents of this story from a little-known Italian book, *Vittoria Savarelli*, and his reputation hardly recovered this charge until the appearance in the *Moniteur* of his series of stories, *Les Mariages de Paris*. From that time his literary career was a series of successes. His next novels were *Le Roi des Montagnes* (1856), a story full of humorous incident, which pleased everybody except the Greeks; and *Germaine* (1857), a clever story of contemporary Parisian life. Four other novels of note must be named: *Les Échasses de Maître Pierre* (1858), *Madelon* (1863), *La Vieille Roche* (1865), and *Le Roman d'un Brave Homme* (1880), the last an attempt, that had less success than it deserved, to show the French public that a novel may be interesting and yet fitted for general reading. None of About's works deserved their popularity more than his three short fantastic tales, *L'Homme à l'oreille cassée*, *Le Nez d'un Notaire*, and *Le Cas de M. Guérin*, all published in 1862; while his *Traité et Quarante* (1865), *L'Infime* (1867), and *Les Mariages de Province* (1868), would of themselves have made a reputation. About contributed constantly to the journals of the day, and wrote many plays, few of which, however, were successful on the stage. As a publicist, he enjoyed a wide though mainly factitious reputation, several of his pamphlets being understood throughout Europe to be written with the approval of the Emperor of the French. As a newspaper correspondent he was present at the opening of the Suez Canal, and accompanied Macmahon in the Franco-German war. His *Alsace* (1872) and some newspaper articles cost him a week's imprisonment at the hands of the German authorities, who chose to treat him as a German subject, because he had been born in Lorraine. About had been decorated with the Cross of the Legion of Honour in 1868, and in 1884 received the coveted distinction of election to the Academy, but died just before he was formally received, January 17, 1885.

Abacadabra, a magical word or formula constructed out of the letters of the alphabet, and supposed to be highly efficacious for the cure of agues and fevers. The letters were written so as to form a triangle, capable of being read many ways on a square piece of paper, which was folded or stitched into the form of a cross; worn as an amulet in the bosom for nine days; and ultimately thrown backward before sunrise into a stream running eastward. The adjoining is one way of arranging this mystic word.

Abraham, the father of the Hebrew people, was also, according to the Bible narrative, the restorer of the primitive belief in one true God. His history is contained in Gen. xi. xxv.; and it is on the account there given that the Rabbinical and Mohammedan amplifications are based. Abraham, originally known as *Abram*, was the son of Terah, a descendant of Shem, and was born in Ur of the Chaldees. This site, long supposed to be at Edessa, or elsewhere in the north of Mesopotamia, is by Schrader and most recent scholars (Tiele dissenting) identified with the ruin-mounds of El Mughair, low down on the western side of the Euphrates. In Ur, Abraham married his half-sister Sarai (afterwards Sarah). From Ur, Terah with his family migrated up the valley of the Euphrates to Haran, in the north-west of Mesopotamia;

and there Terah died. Abraham, accompanied by his nephew Lot, and apparently at the head of a numerous following, received a call from Jehovah, in obedience to which he passed west and south into Canaan, and established himself for a time at Sichem. Thence as a nomadic chief or sheikh he wandered towards the South, and was driven by famine into Egypt, where Sarah was taken by Pharaoh into his harem. A similar outrage is represented as having befallen her at the hands of Abimelech, the Philistine king of Gerar, when well advanced in years. (See Gen. xx., and compare the story of Abimelech and Rebekah in Gen. xxvi. 9). Returning from Egypt into Southern Palestine, Abraham and Lot parted company; and Abraham pitched his tent at Mamre, near Hebron, which continued the headquarters of his family and tribe until his death. Abraham was wealthy in flocks and herds, and could bring into the field an army of his warlike nomadic tribesmen sufficiently powerful to meet and defeat four kings in battle, so as to rescue his nephew Lot when taken captive. His first-born son, Ishmael, was born to him in his 87th year by Hagar, an Egyptian slave. Jehovah appeared to him more than once; made a covenant with him, granting the land for ever to his descendants; and promised a son by his wife Sarai, whose name was changed to Sarah, as his own was from Abram to Abraham. The rite of circumcision now instituted marked the covenant people from the Canaanites. Sarah's son, Isaac, was born when her husband was 100 years old. Then came the mysterious proving of Abraham by God, when God commanded that Isaac should be offered up as a human sacrifice on a mountain in the land of Moriah, the ram being ultimately substituted for the well beloved son. Sarah died, and was buried in the cave of Machpelah, near Hebron, in a patch of ground bought by Abraham; and afterwards, apparently when he was upwards of 130 years of age, Abraham married Keturah, and became the father of six sons by her. On his death, at the age of 175, he was buried beside Sarah in

the special covenant relations, by and powerful oriental pastoral chief, dignified and generous, true to his word, loyal to his kindred, devoted and faithful to his God. Jews and Christians alike accept him as the type of perfect faith and true religion, 'the friend of God'; 'Abraham' is, for all good Moslems, the 'father of the faithful.' Numerous non-scriptural traditions add little of importance to the picture given in Genesis, and completed by allusions in the later Scriptures: though the Mohammedans tell many picturesque tales to illustrate his character; bring Abraham to Mecca to build the Kaaba (q.v.), and believe he remains to have been covered by the famous mosque near Hebron. The later Jews and Mohammedans select Abraham as the incarnation of perfect wisdom, and attribute to him the invention of writing. He was regarded as the ancestor not merely of the Israelites and the Ishmaelite Arabs, but of the other races in Northern Arabia, of Edomites (through Esau), and Midianites.

The name Abram means probably 'high father'; the interpretation given to Abraham, 'father of a multitude of nations,' is possibly not an etymological explanation. The date of his arrival in Canaan has been very variously computed. Bunsen put it so far back as 2866 B.C., and Lipsius as late as 1730-1700 B.C. If recent Assyrian scholars are right in identifying Arioch, the king of Ellasar, defeated by Abraham, with Eri-aku, king of Larsa, who reigned in 2120 B.C. according to the inscriptions, then the date of Abraham's coming into Canaan would be very near that proposed by Hales, 2153 B.C. Von Bohlen, Dozy, Bernstein,

and Goldziher try to prove Abraham a myth; others have compared him with Brahma and Buddha. See Ewaki, Schrader, and commentaries on Genesis by Delitzsch, Dillmann, and others; Tiele, *Asyrisch-Babylonische Geschichte* (1887).

Abraham, the Plains of, or Heights of, close to the city of Quebec, were the scene of the battle between Montcalm and Wolfe, 13th September 1759. See WOLFE.

Abraham-a-Santa-Clara, a very eccentric but popular German preacher, was born near Möskirch, in Swabia, July 4, 1644, and died in Vienna, December 3, 1709. His real name was Ulrich Megerle, but he is generally known by his assumed monastic name. He was provincial prior of the Augustinians, and court preacher at Vienna. Uncouth puns, sharp and homely satire, and strange freaks of humour, marked his sermons; but under the fantastic shell there was a sound kernel. He was unsparing in his censure of the vices alike of courtiers and the people. His collected works fill 22 vols. (1835-50).

Abraham-men, a class of sturdy beggars who simulated lunacy, and wandered about the country in a disorderly manner; at one time working on the sympathy, and at another on the fears of women, children, and domestics. They were common in Shakespeare's time, and, it would seem, existed even as late as the period of the civil war. The term is a cant one, as old at least as 1561. An 'Abram cove' meant one who personated a 'Tom o' Bedlam.' He 'would disguise himself in grotesque rags, with knotted hair, and with many more disgusting contrivances to excite pity; but he did not hesitate to live by thieving too, and when detected pilfering, or in any species of depredation, he pleaded the immunities of the real Bedlamite, who was formally permitted to roam about the country when discharged from 'Bethlem Hospital.' A verbal relic of this class is still preserved in the slang phrase, 'to sham Abraham.'

Abrantes, a town of Portugal, on the Tagus, 84 miles NE. of Lisbon. Pop. 17,850. Abrantes gave a ducal title to famous king.

Abraxas Stones are *abraxas* engraved on them. They are cut in various forms, and bear a variety of emblematic symbols, mostly composed of a human body, a fowl's head, and serpentine extremities. These gems are common in collections, and are represented as coming from Syria, Egypt, and Spain. The use of the name Abraxas was at first peculiar to the Gnostic sect of the Basilidians; and as the word, by



taking the numerical value of its Greek letters, signifies the number 365, the Basilidians used it to indicate the 365 orders of spirits believed by them to emanate from the Supreme God (see BASILIDES). The doctrines and phrases of the sect were carried by the Priscillianists to Spain. But similar symbols were afterwards adopted by all sects given to magic and alchemy; and there is little doubt that the greater part of the abraxas stones were made in the middle ages as talismans.

Abrogation is a term of Canon Law, which means the entire, as distinguished from the partial change of an existing law e.g. the papal decretals as to clandestine marriage were abrogated by the Council of Trent. The term is used popularly as the equivalent of repeal, whether by statute or contrary usage; and in England technically for the annulling of an order issued by a subordinate legislative authority. The Canon Law recognised the

principle of abrogation by non-usage, especially where circumstances changed; thus a canon passed in times of schism might not be enforced when the schism had been suppressed. See DESUETUDE, REPEAL, STATUTE.

Abrus. See PRAYER BEADS.

Abruzzo (or rather the *Abruzzi*), a district of Central Italy, was formerly the north-east corner of the kingdom of Naples, in the wildest and loftiest portion of the Apennines. The jagged mountain-groups reach in the Gran Sasso d'Italia an elevation of 9600 feet. The climate of Abruzzo is raw in the higher regions; snow rests on the hills from October to April, and on some of the peaks all the year round; but the valleys are extremely fertile. Dense forests clothe the sides of the mountains. The Abruzzi used to have three divisions: Abruzzo Ulteriore I. and II., and Abruzzo Citeriore, corresponding to the present provinces, Chieti, Teramo, and Aquila respectively; and forming, with the province of Campobasso, the *compartimento* of the Abruzzi and Molise. The three Abruzzi contain about 5000 sq. m., and 1,000,000 inhabitants.

Absalom, the third son of David, king of Israel, remarkable for his beauty, and for his unnatural rebellion against his father. By his popular manners, he contrived to win the affections of the people, and then stirred up a formidable rebellion. A battle was fought in the forest of Ephraim, in which the rebels were defeated. In the flight, as Absalom was riding under a tree, he was caught (by his long hair, as is generally supposed, though not expressly stated in Scripture) in the branches, and was left suspended; in which position Joab, the commander of David's army, thrust him through, contrary to the king's express orders that he should be spared. The grief of David for his loss was excessive. See 2 Sam. xviii.

Absalon, Archbishop of Lund. See AXEL.

Abscess (technically called *Apostema*), a circumscribed collection of purulent matter formed by disease within some tissue or organ of the body. The process by which an abscess is formed is the following: First, the capillary vessels become overcharged with blood, in consequence of inflammation. From the blood thus made stagnant, or flowing very feebly, a much larger amount of fluid than in health, with numerous white blood-corpuscles, exudes through the walls of the capillary vessels, and becomes *Pus* (q.v.) or *matter*. This matter, at first contained in the minute interstices of the tissues, gradually dissolves them, and so makes for itself a larger cavity; and frequently, by disintegration of the adjacent parts, works its way either to the surface or to some natural cavity of the body. Pus thus makes its appearance often in a different part of the body from where it was formed. The abscess cavity is bounded by an inflamed and swollen layer of tissue; not, however, containing pus. Occasionally, when the purulent matter does not find any outlet either naturally or artificially, it is gradually dried up or absorbed. In the great majority of cases, however, cure only takes place after the pus has been discharged. Abscesses may be *acute*, forming in a few days with much pain; or *chronic* or *cold*, taking weeks or months to form, with little or no pain. In abscesses superficially seated—either in or close under the skin—the early treatment consists chiefly in promoting the formation of pus by the application of moist and warm bandages or poultices. The next step is the removal of the pus. When this is too long delayed, serious disturbance of the organ, and destruction of surrounding structures, may ensue. An abscess

must be regarded not as a distinct, original disease in itself, but as the result of another disease—inflammation; or as an effort of nature for the removal of injurious matters from the system. Abscess is now known in many cases to be caused by the presence of microscopic organisms (*micrococci, bacteria*) in the tissues. See GERM THEORY, SUPPLICATION.

Abscissa. See PARABOLA.

Absentee, a term applied, by way of reproach, to landlords who derive their rent from one country, and spend it in another. It has been especially used in discussions on the social condition of Ireland. As long as Ireland had its own parliament, a great portion of the large landed proprietors lived chiefly in the country during summer, and passed their winters in Dublin; thus spending a large portion of their incomes among their dependents, or at least among their countrymen. The Union changed the habits of the Irish nobility and gentry, who were attracted to London as the political metropolis, or were induced, by the disturbed condition of Ireland, to choose residences on the Continent. Such Irish landed proprietors were styled 'absentees;' and it was argued that their conduct was the great source of Irish poverty, as it drained the resources of the land, or, in other words, sent money out of Ireland. This, however, is not the only objection alleged against the system of absenteeism. One of its prominent results is to place the control of the Irish estates too much in the hands of agents and middlemen. As the landlord does not live among his tenantry, there cannot grow up between him and them that feeling of sympathy and community of interest, which should subsist between such important classes of the same country. The tendency of the system has been to weaken the sense of responsibility in owners of property, who are too distant to know the real needs and circumstances of the trust committed to them. It is now generally admitted that absenteeism is one of the leading causes that have brought about the present state of discord in Ireland. In conclusion, reference should be made to a new form of absenteeism that is already beginning to excite attention in America. A great deal of the land of the United States and of the colonies is held by proprietors living in England and on the continent of Europe. In this way, large sums are paid every year to owners who are so remote and know so little of their estates, that they cannot possibly fulfil the recognised duties of property. It will be seen that the objections brought against the absentee are both moral and economic.

Absinthe is a spirit flavoured with the pounded leaves and flowering tops of certain species of *Artemisia*, chiefly wormwood (*A. absinthium*), together with angelica-root, sweet-flag root, star-anise, and other aromatics. The aromatics are macerated for about eight days in alcohol, and then distilled, the result being a green-coloured liquor. Adulteration is largely practised, usually with the essential oils of other herbs; but even blue vitriol is sometimes found in so-called absinthe. The best absinthe is made in Switzerland, the chief seat of the manufacture being in the canton of Neuchâtel. It is chiefly used in France, but is of late largely exported to the United States. When to be drunk, the greenish liquor is usually mixed with water; whereupon the precipitation of the contained volatile oil causes the mixture to cloud or whiten. The evil effects of drinking absinthe are very apparent; frequent intoxication, or moderate but steady tipping, utterly deranges the digestive system, weakens the frame, induces horrible dreams and hallucinations, and may end in paralysis or in idiocy. Absinthe was first introduced

into common use in France through its being prescribed as a febrifuge to the soldiers during the Algerian war (1832-47). See WORMWOOD.

Absolute stands opposed to *relative*, and means that the thing is considered in itself, and without reference to other things. In physics, we speak of the *absolute* velocity of a body—i.e. the rate of its motion through space; and of the *relative* velocity of two bodies—i.e. the rate at which they approach or recede from one another, one or both being in motion. In the language of modern metaphysics, the Absolute is the unconditioned, unalterable original—that which is the ultimate cause and ground of the phenomena of the visible world. For the possibility of knowing the absolute, see CONDITIONED (Philosophy of the), and GOD. In Chemistry, absolute alcohol is pure, unmixed alcohol. See ABSOLUTISM.

Absolution, originally a term of Roman law, signifies acquittal. The word is generally used in an ecclesiastical sense. In the primitive Christian Church, members who had given scandal by gross and open sins were excluded from the Lord's Supper, or from the congregation altogether, and could be readmitted only if they repented and underwent the penance laid upon them by the church. When they had done so, the presbyter, along with the elders, pronounced the absolution in presence of the congregation, and the congregation received the sinner again into their number. After auricular confession became obligatory, absolution was held to convey forgiveness in the sight of God. The formula, *Deus or Christus absolvet te*, which was used till the 12th century, was changed into *Ego absolvo te*. As defined by the Council of Trent, *absolution from sin* is a judicial act by which the priest as judge passes sentence on the penitent, and is a remission of sin made by authority of Christ in the sacrament of penance. It is not a mere declaration that God will pardon those who repent. It has been affirmed by some writers that instead of 'I absolve thee,' a precatory form, such as 'May Christ absolve thee,' uttered by the priest in presence of the person to be absolved, would suffice. But this is disputed. *Absolution from censures*, also granted by the priest with or without the sacrament of penance, is quite different, and merely removes the penalties imposed by the church, and reconciles the offender with the church; whereas absolution from sin gives grace, removes guilt, and reconciles the sinner with God. *Absolution for the dead* is a form said after a funeral mass.

The Protestant churches mostly ascribe to the absolution of the clergy only a declarative, and not an executive power; on the ground of repentance, it announces and assures forgiveness on the part of God, but does not impart it. From this view must, however, be excepted the Lutheran and Anglican formularies, Luther himself and an entire school of Anglican divines. For the Anglican documents, see the Prayer Book, especially the Exhortation to Holy Communion, and the Office for the Visitation of the Sick. The *catech* of English divines who hold this doctrine is not confined to one school, as it includes Archbishop Usher, and even Baxter. Nor must it be forgotten that the belief in a certain measure of absolving power residing in the whole church was widely spread in the middle ages; and the Sire de Joinville, a layman, tells how he and a brother knight in imminent danger, when no priest was to be had, mutually confessed and absolved each other. Peter Lombard entirely justifies such an act as that of Joinville; Aquinas seems to consider it irregular. In England, Sir John Friend and Sir William Perkins, convicted of having planned the assassination of William III., received at

Tyburn, just before their execution, a solemn and public absolution at the hands of a celebrated non-juring divine, Jeremy Collier. The bishops censured this act on the ground that there was no proof of a previous confession having been made. See CONFESSIO, PENANCE. In Scotch law, the accused in a criminal case is absolved by the forms *absolutor* or *assolzie*, on the ground that evidence disproves or does not prove the charge.

Absolutism is a form of government in which the royal power is not limited by any constitutional check. The great era of absolutism in Europe was that which followed on the downfall of the feudal system. The form of monarchy then established was based on the subordination both of the nobles and the church to a strong centralising power, with large revenues and a regular army. The central power was represented by a monarch whose will was supreme. The old feudal nobles were transformed into courtiers. Not only the church, but law, science, and the universities were taken into his service. A professional army took the place of the old feudal militia. For the needs of such a state, a regular revenue, paid in money instead of the feudal payment in kind, was essential. Louis XIV., with his celebrated dictum, *L'état, c'est moi* (I am the state), may be regarded as the representative absolute monarch. We had a milder form of it in England under the House of Tudor, the so-called personal monarchy. It should be recognised that the absolute centralising monarchy was a necessary stage in the evolution of the modern state. The centralising tendency was necessary for self-defence, and could be effected only by a strong monarch. The ruin of Poland was chiefly due to the fact that it never had a central government vigorous enough to repress the anarchic nobles, and weld the nation into one. The era of absolute monarchs has been virtually closed by the revolutionary movements of 1789 and 1848, the effect of which has been to establish representative institutions in most civilised countries. See AUTOCRACY.

Absorption. In Physics, when a quantity of matter or of energy enters into a substance so as to be associated with it in some way (excepting chemical combination in the case of absorption of matter) for a longer or shorter time, it is said to be absorbed by that substance. The nature of absorption differs, of course, with the nature of the thing absorbed and the nature of the absorbing substance. Thus gases are absorbed largely by some solids, the phenomenon being called Occlusion (q.v.) in this case. See also the articles on Solution, Fluorescence, Spectrum (for Absorption-spectrum), and especially that on Radiation of Heat. The term is also applied (1) in Animal Physiology to the osmosis of the dissolved matter of the chyle into the vessels of the intestinal villi; (2) in Vegetable Physiology, to the passage of water by endosmosis into the cells of the roots; and also (3) to the initial steps in the process by which the green parts of plants, in sunlight, absorb carbonic acid gas and decompose it. See PHYSIOLOGY, VEGETABLE CHEMISTRY. For absorption and solvents in anatomy and medicine, see LACTEALS and LYMPHATICS.

Abstinence Societies, associations for the promotion specially of abstinence from all kinds of alcoholic liquors. See TEMPERANCE.

Abstract, in Law, means a short statement of the contents of a document, such as the *precis* writing in diplomacy, but in England it is used most commonly as the technical name of the summary of the deeds and facts constituting a title to land, which every seller is bound to furnish to the purchaser, unless the contrary has been stipulated. The form of this abstract is in four

columns, each appropriated to a particular class of clauses in the deed, or of facts, such as dates, death, marriage, &c. Like the Scottish progress of titles, the abstract seldom goes back more than twenty years. If there is any defect in the abstract, the purchaser must object within a certain time by making a requisition. When a deed is submitted for stamping, the commissioners generally require an abstract of it.—**ABSTRACT** in Arithmetic is applied to numbers considered in themselves, and without reference to any objects numbered; thus 7, 20, are abstract numbers; but 7 feet, 20 horses, are concrete numbers.

Abstraction is that intellectual process by which the mind withdraws some of the attributes of objects from the others, and thinks of them to the exclusion of the rest. The abstract is opposed to the concrete. John, William, my brother, form concrete images in my mind, each with a multitude of attributes peculiar to himself. But they have also certain attributes common to them and to all individuals of the race, I can overlook the others, and attend to these, and thus form a notion or conception, which is called a *man*. Man is therefore an abstract notion, the word connoting, as it is called, a certain though not very well-defined number of attributes. With the exception of proper names, all nouns are thus abstract. There are degrees, however, in abstraction. The abstract notion *animal* rises above that of *man*, embracing all men and innumerable organised beings besides. An *organised being*, again, is a still higher stage, and embraces both animals and plants. Being, time, space, are among the highest abstractions. Abstraction is the basis of classification into genera and species (see GENERALISATION). The higher abstractions rise, the fewer attributes are implied or connoted in the name. On the other hand, the number of objects to which the name is applicable, increases; and thus reasoning in abstract terms has the advantage of being general, or extensive in its application. But such reasoning is apt to become vague and fallacious, unless constant regard is had to concrete instances.

Absurdum, REDUCTIO AD, a method of proving a truth indirectly, by showing that to suppose the proposition untrue would lead to an absurdity, or that the contrary of the proposition is impossible. The method is much used in geometry.

Abt, FRANZ, composer of song-music, was born 22d December 1819 at Eilenburg, in Prussian Saxony, and was educated at Leipzig for a time student of theology. From 1841 to 1881 he held musical offices at Bernburg, Zurich, and Brunswick; in the latter year he retired with a pension to Wiesbaden. Of his tuneful settings, more than 200 in number, the best known is 'When the Swallows homeward fly.' He died 31st March 1885.

Abu (Arabic, 'father') is prefixed to many Arabic proper names, as the equivalent syllable *Ab* is prefixed to Hebrew names—Abn-bekr, &c. But *Abu*, like *Ab*, often signifies merely 'possessor,' as in Abulfela (possessor of fidelity), 'the Trusty.'

Abu, a mountain of India, in the territory of Serohce, Rajputana, a detached granite mass rising like an island from the plain of Marwar, near the Aravalli ridge, and in its highest point reaching 5650 feet above the sea. It is a celebrated place of pilgrimage, especially for the Jains, who have a magnificent group of five temples at Delwara, about the middle of the mountain, two of which are the most superb of all Jain temples. Both are built of white marble, finely carved, and date from 1031 and 1197 A.D. The mountain contains a beautiful lake 4000 feet above the sea;

and the region is a hot-weather resort for the government authorities and Europeans.

Abu-bekr ('father of the maiden') was so called as being the father of Ayesha, the wife of Mohammed, was born at Mecca in 573 A.D., and was a man of great influence in the Koreish tribe. He was the Prophet's most trusted follower; and in 632, when Mohammed died, was made the first calif or successor of the Prophet. Ali, the Prophet's son-in-law, expected the succession, but submitted; the sect of the Shiites (q.v.) to this day protest that Abu-bekr was wrongfully appointed. Abu-bekr had to suppress the relapse of some tribes into heathenism; defeated the false prophet Mosaylima, and after victoriously overrunning Syria and Babylonia in spite of the Byzantine emperor Heraclius, died in 634 A.D., and was buried at Medina, near the grave of Mohammed. See MOHAMMED.

Abu Klea, on the route across country between Korti and Metammeh, both on the great bend of the Nile below Khartoum, was the scene of a battle on the 17th January 1885, in which Sir Herbert Stewart defeated the Mahdi's forces.

Abulfaraj (Lat. *Abulfaragius*), called also Barhebraeus - as being of Jewish descent - was born in Armenia, 1226, and became distinguished for his knowledge of the Syriac, Arabic, and Greek languages, and of philosophy, theology, and medicine. At the age of twenty, he was made a bishop, and as Bishop of Aleppo rose to the highest dignity among the Jacobite Christians next to Patriarch. Of his numerous writings, the best known is a *Chronicle*, in Syriac, of universal history from Adam down to his own time. Among his theological writings is a commentary on the Syriac version of the Bible.

Abulfeda, ISMAIL-BEN-ALI, a Moslem prince, known as a writer of history, was born in 1273 at Damascus; and during his youth, distinguished himself in several campaigns against the Christian kingdom founded by the Crusaders. He ruled from 1310 over the principality of Hamat in Syria, as an independent ally of the sultan, was a generous patron of literature and science, and died in 1331. He left several important works in Arabic, among which are his *Annals*, one of the most valuable sources of history for the Saracen empire. It has been edited and translated into Latin (5 vols. 1789-94) by Reiske; the earlier part, *Historia antecristiana*, by Fleischer (1831). His other great work is his famous *Geography*.

Abushehr. See BUSHIRE.

Abu-Simbel (also *Abousambel* or *Ipsambul*), a place on the left bank of the Nile, in Lower Nubia, the site of two very remarkable rock-cut temples, amongst the most perfect and noble specimens of Egyptian architecture. Here there is no exterior and constructed part: the rock out of which they have been excavated rises too near the river. Still the temples have their façade, as richly decorated and as monumental in its character as those of the most sumptuous edifices of Thebes. The colossal statues here, instead of being isolated monoliths, are a part of the façade itself, hewn out of the rock, though still forming part of

it. The façade of the smaller temple, that of Hathor, is 88 feet long and 39 feet high. It has six colossal figures, about 32 feet high, of which four represent Rameses, and the other two his wife, Nefert-Ari. The façade of the great temple is larger, being 126 feet long and 93 feet high. The cornice is formed by twenty-two dog-headed figures seated, the fore-paws resting on the knees, each 8 feet high, sculptured in relief, only attached to the mountain by their hinder parts. Below the cornice runs a frieze formed by the dedicatory inscription, engraved deeply in bold hieroglyphics. Above the door is sculptured a colossal figure of Râ, on both sides of which Rameses is represented in the attitude of adoration. Most striking, however, are the four colossal figures of Rameses, two to the right, two to the left of the door. These are the largest figures of Egyptian sculpture, being



Façade of the Great Temple at Abu-Simbel.
(From a Photograph by Frith.)

66 feet high from the feet to the *pschent* with which the king's head is covered. Rameses is seated, his hands resting on his thighs, in the ordinary posture of royal statues at the entrance to temples. In spite of its enormous proportions, the work is very fine; the face especially is remarkable for an expression of sweetness and of strength in repose that has struck all travellers. The depth of the smaller temple from the door is 88 feet. The great temple is much larger, being 180 feet long from its threshold to the innermost part. The first hall is 59 feet long and 55 feet wide. The second and third are less spacious. The fourth, the adytum, consists of three chambers. Everywhere are pictures like those at Luxor and Karnak, representing the battles and the triumphs of Rameses. Reproductions of two of these, on the scale of the original, form very striking objects in the Crystal Palace.

Abutment, in Architecture, is the part of a pier or wall from which an arch springs, and which resists the outward thrust. In reference to a bridge, the abutments are the walls adjoining the land, which support the ends of the roadway or the extremities of the arch or arches.

Aby'dos, (1) a town in Asia Minor, situated at the narrowest part of the Hellespont, opposite Sestos.

It is celebrated in history as the place whence Xerxes and his vast army passed into Europe in 480 B.C.; and in poetry on account of the loves of Hero and Leander. Its inhabitants were dissolute and effeminate, but they made a heroic stand against Philip II. of Macedonia.-(2) A city of Upper Egypt, on the left bank of the Nile, once second only to Thebes, but even in the time of Strabo a mere ruin. Here the remains of the Memnonium and of a temple of Osiris are still remarkable; and here was discovered the celebrated Tablet of Abydos, bearing in hieroglyphics a genealogy of the eighteenth dynasty of the Pharaohs. It is now in Paris.

Ab'yla. See CETA.

Abysmal Accumulations consist of those organic and inorganic materials which form over the deepest portions of the sea-bottom, where no terrigenous or land-derived sediments occur. The most conspicuous and widely spread of abysmal accumulations is a fine red clay which owes its colour to the presence of oxides of iron and manganese. In this deposit occur grains of various volcanic minerals and fragments of pumice, while the clay itself is believed to be the result of the chemical action of sea-water on similar volcanic materials. The organic abysmal accumulations consist of various kinds of ooze, made up largely of the dead shells of foraminifera, pteropods, heteropods, and radiolarians, and the frustules of diatoms. Scattered through the abysmal accumulations occur, often in considerable quantities, ear-bones of whales, beaks of xiphias, teeth of sharks, some of these belonging to extinct species. In the red clays, metallic sphenules, which are thought to be of cosmic origin, or, in other words, meteoric dust, frequently occur. The accumulation of these and the organic remains just referred to, in such relatively great abundance, shows us that the red clay in which they occur must accumulate very slowly. See GLOBIGERINA, OOZE.

Abyssinia (from the Arabic name *Habesh*, 'mixture,' given on account of the mixed population) is that part of Eastern Africa lying between 7° 30' and 15° 40' N. lat., and the meridians of 35° and 40° 30' E. long.; having Nubia on the NW., the Red Sea on the NE., the river Hawash on the SE., and the Blue Nile on the SW. The mountainous part of this tract forms the kingdom of Abyssinia; the chief divisions being Tigré in the north, Amhara in the centre, and Shoa in the south. Between the highlands and the Red Sea lies a low arid tract, which is inhabited by tribes distinct from the Abyssinians, and long claimed as belonging to Egypt. Abyssinia, the area of which is about 200,000 sq. m. (more than a third larger than Great Britain), consists of a huge tableland with a mean elevation of 7000 feet. The declivity to the bordering tract on the Red Sea is abrupt; towards the Nile basin it is more gradual. The main mass has been cut into a number of island-like sections by the streams, which have worn their channels into ravines of vast depth as much sometimes as 4000 feet. Isolated mountains, with naked perpendicular sides, present the most singular forms. The Samen Mountains have summits rising to the height of 15,000 feet.

In the later part of the tertiary age, Abyssinia must have been the theatre of immense volcanic activity. That activity is now extinct, with the exception of thermal springs in the interior, and rare eruptions on the coast of the Red Sea.

As the main slope of the tableland is towards the W. and NW., the chief watercourses flow to the Nile. The Abai, which flows through Lake Tzana, is an upper branch of the Blue Nile. The Takazzé, receiving the smaller Atbara, joins the Nile under

the name of the Atbara, after a course of about 800 miles. The Mareb flows NW. into Nubia, where it loses itself in the sand, or in time of flood reaches the Atbara. The Hawash takes its rise in the southern province of Shoa, and flowing in a north-easterly direction, falls into the Lake of Abhebbad. The largest lake in Abyssinia is Lake Tzana (Tsana) or Dembea, 60 miles long, and in some places 600 feet deep. The mineral wealth of Abyssinia is believed to be great, but has been little explored.

The climate of Abyssinia, notwithstanding its tropical position, is on the whole moderate and pleasant owing to its elevation. The region called the Kollas, with an elevation of 3000 to 4900 feet, has a temperature of 77° to 95°, with a tropical vegetation. The plains of medium elevation (5000 to 8800 feet) have a temperature of 60° to 80°, and are the chief seats of the population. The higher regions, from 8800 to 12,000 feet or over, have usually a day temperature of 48° to 50°, but falling not seldom below freezing. The rainy season is in summer, from April to September. During the rainy season there is snow on the summits in all the higher regions, and above 13,000 feet the snow never melts. In the river valleys and swamps, the heat and moisture are suffocating and pestilential; in the low region towards the Red Sea, the air is glowing hot, and dry.

Abyssinia as a whole is exceedingly fruitful; and its productions are of the most varied nature, from the pines, heath, and lichens of North Europe to the choicest tropical plants. Two, and in some places three, crops can be raised in one year. The banana-tree, date-palm, sugar-cane, vine, orange, lemon, cotton, and wild indigo and coffee, all flourish. The higher plateaus furnish rich pastures of European grasses, and also oats and barley. The chief industries are the rearing of cattle and the cultivation of grain. Among the wild animals the most dreaded is the hyæna; while the elephant and rhinoceros are found in the low grounds, and there are crocodiles and hippopotami in the rivers. Lions, panthers, and leopards are not infrequent.

The population of Abyssinia, which numbers between three and four millions, consists of various elements, but the nucleus is formed of the Abyssinians proper a brown, well-formed people, belonging to the Semite stock, and believed to be the descendants of immigrants from Arabia. The basis of the language is the ancient Ethiopic (see ETHIOPIA) or Geez, a Semitic tongue which is now the sacred language, understood only by the priests. Of the modern dialects, the Tigré of the northern province stands the nearest to the old tongue. That of Amhara (q.v.), spoken also in Shoa, departs more from the mother-tongue, and is the prevalent language of the country. Since the beginning of the 16th century, the Gallas, an African people, have taken possession of many districts. Jewish tribes, called Falashas, retain many of their Jewish peculiarities. In addition to agricultural and pastoral pursuits, the chief employments are the preparation of leather, the weaving of cotton cloth, and the working of copper and iron. There is little commerce. The centre of the interior traffic is Gondar, in Amhara. The chief seat of trade in Shoa is Ankobar. What foreign commerce there is passes through the port of Massowah. The chief town of Tigré is Adowa.

The religion of the Abyssinians proper is a debased Christianity; but the Gallas and other alien tribes are mostly Mohammedan, and partly also pagan. Abyssinian Christianity consists entirely in external observances; the people are abjectly superstitious and excessively lax in their morals. They observe many of the rites of

Judaism, such as circumcision and the distinction of animals into clean and unclean. The marriage-rite is very loose, and polygamy is not uncommon. Few except the priests are taught to read. Christianity was introduced in the 4th century by Frumentius (q.v.), who was consecrated Bishop of Abyssinia by the Patriarch of Alexandria. Ever since, the church of Abyssinia has adhered to the mother-church of Egypt, and with her adopted the Monophysite (q.v.) doctrine; and the metropolitan bishop or abuna continues to be nominated by the Coptic Patriarch (see COPTS). The Bible was early translated into the Geez. They have no life at the capt leaders of the

The general ignorance does not exclude religious controversy, and fierce dissensions prevail. There are numerous fasts and feast days. Drinking (of beer and mead) is carried to excess. Beef is eaten raw, and, if possible, while yet warm. The custom reported by Bruce, of cutting a steak from a live cow, is still not unknown.

History.—The native annals of Abyssinia, tracing their kings from Menilek, the son of Solomon by the Queen of Sheba, down to recent times, are manifestly fabulous. The real history begins with the kingdom of Axum (see AXUM, ETHIOPIA). Christianity was introduced in the 4th century. Under the Axumite rulers, Abyssinia attained its greatest extent and prosperity in the 6th century, when it embraced Yemen in Arabia. But by the conquests of the Mohammedans in the following century, the frontiers were driven back to the limits of the tableland, and the Abyssinians were cut off from intercourse with the rest of the world. During these struggles the capital was removed from Axum to Gondar, where the monarchs dignified themselves with the title (assumed about the end of the 13th century) of Negusa Nagast za-Ijopia (king of kings of Ethiopia). With the 16th century began the irruptions of the warlike Galla tribes from the interior of the continent, who committed fearful devastations. The search for the kingdom of Prester John (q.v.) brought the Portuguese in contact with Abyssinia in the end of the 15th century. The design was thereupon formed of converting the Abyssinians to the Catholic Church. With this view an embassy was sent to the Negus (1520); and at last, about the beginning of the 17th century, the royal family submitted to the Roman Church. The body of the people, however, looked upon it with aversion; and in 1634, the monarch was obliged to resign in favour of his son, who banished or executed the Catholic priests.

The monarchs lost all control over the great chiefs, who set up as independent rulers in their several provinces. At length Michel Sehul, the ruler of Tigre, put the reigning monarch Joas to death (1769); and setting up a member of the royal family as nominal sovereign, exercised at Gondar the powers of sovereignty under the name of *Ras* or prime minister. Ras Michel was soon driven from power by a Galla chief, who acquired the dominion of Amhara and the control of the titular sovereign, and transmitted his power to his son and grandson. The latter, Ras Ali, held sway in Amhara as viceroy of the empire, when, about 1850, the adventurer Kassa or Kassai, afterwards known as Theodore, began to excite attention. Kassai was a native (born 1815) of Kuara, a province in the west of Amhara, of which his uncle was governor. After the uncle's death, Kassai, defeating the armies of the Ras, compelled his recognition as governor, and became Ali's son-in-law. In 1853 he crushed the Ras, and two years later, after completely defeating the prince of Tigre, he had himself crowned by the Abuna as Negus of Abyssinia, with the name of Theodore. He then subdued the Wollo Gallas; and having

next conquered Shoa, he was now master of the whole of Abyssinia, and with greater power than was ever wielded by a Negus. This was the acme of his fortunes, which henceforth began to decline. At first he ruled prudently and with moderation, being chiefly guided by two Englishmen, Mr Plowden and Mr Bell, who had become resident in the country, and the former of whom had been appointed consul. But after he lost his two counsellors (who were killed in an attack by a rebel chief in 1860), his rule became more and more tyrannous. The enormous army (as many at one time as 150,000 out of a population of 3 or 4 millions) exhausted the resources of the country. One province after another rose in rebellion, unable to bear the exactions; and these insurrections were suppressed with unheard-of rigour.

Theodore had made several attempts to procure the active alliance of England and France against the Mussulman powers; and as all his efforts had failed, he now began to entertain hatred towards Europeans. When Captain Cameron went to Abyssinia in 1862 as consul, Theodore gave him a letter to Queen Victoria, of which, by some neglect, no notice was taken. A similar letter to the Emperor of the French received an answer, but not from the Emperor himself; and these circumstances so enraged Theodore that he began to maltreat the consuls and their servants, and kept them prisoners along with the missionaries and other Europeans in his dominions. The British Government in 1864 sent envoys to Theodore with a royal letter and presents, to treat of the release of the prisoners. The negotiations failed, and the three envoys were put in irons, and shut up along with the other prisoners in the fortress of Magdala. A British military expedition was now resolved upon, and General (afterwards Lord) Napier was chosen as chief. The troops consisted of 16,000 men of all arms, while the transport service and camp followers numbered at least as many more. The place of landing was Amnesley Bay, and on the 9th April 1867 they reached Magdala. They had met with no obstruction from the inhabitants, who rather welcomed them as deliverers from the common enemy. In the meantime, Theodore had occupied the fort with 5000 or 6000 men, three weeks before the arrival of the British. On the 10th April, 5000 Abyssinians rushed down upon a British detachment of 1700 men in the plain below the fort, but their repeated assaults were repulsed with great loss. Theodore sued for peace, and released the prisoners; but as he declined to surrender, the fort was stormed and taken on the 13th. Theodore was found dead; he had shot himself. The fort being demolished, the British forces were entirely withdrawn. The expedition cost the British nation nearly 9 millions sterling.

The departure of the British was the signal for a renewed struggle among the Abyssinian chieftains for the supremacy. Prince Kassai of Tigre, who had been of great service to the British, vanquished his most powerful rival, and had himself crowned Emperor of Abyssinia in 1872, assuming the name of John; but failed to establish his rule over the whole country. He made repeated but vain attempts to get European help against the Egyptians, with whom Abyssinia had been at enmity since 1860. In 1875 the Khedive sent a small force; but they fell into an ambuscade, and were all massacred. In the same year, a second expedition of 1600 men was sent against the Abyssinians, and a short sanguinary campaign followed, in which both parties lost so heavily that each was compelled to retire and the frontier difficulties continued until the Soudan was evacuated by Egypt in 1882. In 1885 the Italians occupied Massowah, but they did not succeed in establishing friendly

relations with the Abyssinians. On the 26th of January 1887, three companies of Italian soldiers were attacked by the Abyssinians, and, notwithstanding their gallant resistance, all were slaughtered, with the exception of 90 wounded, who managed to make their way back to Massowah. See, besides the works of Bruce and the brothers Abbadie, Markham's *History of the Abyssinian Expedition* (1869), and Holland and Hozier's official report thereon (1871).

Acacia, an important genus of leguminous trees or shrubs, belonging to the sub-order Mimoseae, distinguished from Mimosa by the greater number of stamens, usually indefinite, and by the absence of transverse partitions in the pods. The species are for the most part natives of tropical Africa (140 species) or Australia (280 species), are frequently

thorny, and exhibit extraordinary differences in general appearance, owing to the remarkable modifications of the vegetative organs. The normal type of leaf is bipinnate (fig. 1); but is often modified, especially among the species which have had to become adapted to the intense heat and drought of Australia, where they greatly abound, forming 'acacia-scrub.' The leaf-blade entirely ceases to be developed, and the leaf-stalk becomes vertically flattened into a 'phyllode,' which thus resembles a



Fig. 1.—Acacia (*A. arab*)

simple leaf, and performs vegetative functions; but, like the leaves of many species of Eucalyptus, presents on its edge to direct sunshine; and by its thick and strong epidermis is further adapted to resist transpiration. The line of modification is beautifully indicated by such a species as *Acacia heterophylla* (fig. 2), in which, along with the



Fig. 2.

Fig. 3.

Fig. 4.

phyllodia, many of the normal bipinnate leaves survive; as also by seedlings (fig. 3), which invariably develop one or two bipinnate leaves after the cotyledons, and usually also show transitional forms to phyllodia, even in species so extremely modified

as *Acacia alata*, where even the phyllodial type becomes disguised by the downward continuation of the phyllode into an expanded wing running down the stem, somewhat like the decurrent leaves of a thistle (fig. 4). Many species are also cultivated in our greenhouses for the sake of their flowers, which are united into golden stamen-tufts of great beauty, and are often fragrant. The leaves often exhibit Sleep-movements (q.v.) analogous to those which are developed into sensitiveness in some of the allied Mimosas (see SENSITIVE PLANT), and in some species close whenever the sun is clouded. The genus is also of great and varied economic importance, not merely as frequently yielding timber or edible seeds in the regions where they flourish, but as possessing the astringent and gum-yielding properties common in the sub-order in the highest degree. The drug known as Catechu (q.v.) is prepared from *Acacia catechu*; while of still greater importance are the products yielded by the degeneration of the cell walls of the inner bark (bast-parenchyma and sieve-tubes). These substances are known in commerce as Gum Arabic, Gum-Senegal, &c., and are obtained from *Acacia arabica*, *Acacia senegal*, and other species (see GUM). Some species of Robinia, such as the North American locust tree (*R. pseudo-acacia*), *R. hispida*, Rose acacia, &c., are often erroneously called acacia in Europe and the United States, sometimes also thorn-acacia (a false acacia), but belong to a distinct sub-order of Leguminosae, the Papilionaceae, having violet, pea-like flowers. *Flores Acaciae* is an old medical name for sloe flowers.

Academy (Gr. *akadēmia* or *akadēmia*) was the name of a public park nearly a mile to the NW. of Athens, equipped as a gymnasium by Hipparchus, and bequeathed to the citizens as a pleasurable ground by Cimon, son of Miltiades, who had adorned it with avenues of trees, statues, and altars. In its shady walks (the 'groves of Academe') Plato was wont to converse with his disciples and friends; and so the name of the meeting place, said to have been originally derived from the hero Academus, came to be used as a distinctive title of Plato's school and of the Platonic philosophy. The various phases of development or perversion which Plato's principles underwent at the hands of a long train of successors are spoken of as the *Old Academy*; the *Second* or *Middle Academy*, led by the disputations Arcesilanus (q.v.); and the *New Academy*, of which the sceptical Carneades (q.v.) was the head. Occasionally the professedly Platonic system, as taught by Philo and Antiochus respectively, is referred to as the Fourth and Fifth Academies. Cicero's *Questions Academicæ* had their name from one of his villas known as *Academia*. At the revival of classical studies in the 15th century, the name academy came to be given in Italy either to associations of learned men or to educational institutes, and a like divergence still marks the use of the term. In Germany it is generally used of learned societies, is occasionally applied to the universities, and is the recognised denomination of many technical institutes, such as military and naval academies, schools of mining, agriculture, and forestry. In England and America, academies may be grammar schools, military and naval educational schools, or associations for the promotion of music and the fine arts. Sometimes 'academy for young gentlemen' is simply an elementary boarding-school. In France, by academy is sometimes meant not only a learned society, but the whole educational staff of a large territorial area, or division of the University of France. The *Académie* of Geneva is its university. The Grand Opera in Paris is officially, but strangely, termed *Académie Impériale de Musique*, an example followed by several of the comic theatres. In America (as at

New York, &c.) the name Academy of Music is often used of opera-houses.

In its most universal modern acceptation, the word academy denotes a society of learned men, incorporated for the promotion of science, literature, or art; and this usage is well understood even where, as in England, such learned bodies are generally termed societies. The first institution in ancient times that seems to merit the name, in this sense, of academy, was the celebrated *Museum* founded at Alexandria in the 3d century B.C. by Ptolemy Soter, which concentrated in that intellectual capital all that was most eminent in science, philosophy, poetry, and criticism. After this model, the Jews, and at a later period, the Arabians, founded numerous institutions for the promotion of learning. In the middle ages, with the exception of the Moorish institutions at Granada and Cordova, in which poetry and music formed prominent subjects of study, we find nothing corresponding to the modern idea of an academy, save the learned society established by Charlemagne in his own palace, at the suggestion of his teacher Alcuin. In the following centuries there are no traces of any like associations; during the middle ages such learning and science as survived had taken refuge within the monasteries. The academy of the fine arts founded at Florence by Brunetto Latini in 1270; that by Frederick II. at Palermo in 1300; and the *Académie des Jeux floraux* at Toulouse, in 1323, existed solely for the culture of poetry. Not till the revival of classical studies in the 15th century did those associations of learned men arise which soon accomplished so much for promoting a freer development of human thought, in opposition to the narrowness of ecclesiastical tradition and monastic practice. The *Accademia Platonica* of Florence, established by Lorenzo de' Medici in 1474, devoted itself not only to the investigation of the Platonic philosophy, but to the purification of the Italian tongue, and the study of Dante; thus becoming the model of many like institutions in all the more important Italian cities, though it was itself dissolved in 1521. The *Accademia della Crusca*, or *Accademia Eufuraturum*, was founded at Florence in 1582; its principal service was the compilation of an excellent dictionary, and the publication of correct editions of the older Italian poets. The Neapolitan *Accademia Secretorum Nature*, founded in 1560 for the prosecution of the physical sciences, was the first of its kind, but was speedily suppressed by the church. Among the many associations upon its model were the short-lived *Accademia de' Librai* in Rome (1609), and the *Accademia del Cimento* at Florence (1657). All these and their numerous sister academies in Italy were independent associations, occasionally patronised by princes, but consisting of private persons, and not recognised or formally sanctioned by the state.

A new development was given to such bodies when, in 1635, Richelieu transformed a private association of poets of no great note into a national institution, the *Académie Française*, which met for the first time, 10th July 1637. The chief object of this institution was to render the French language pure, eloquent, and capable of treating the arts and sciences; and it pledged itself to compose a dictionary, a treatise on rhetoric, and a treatise on poetry. The great dictionary, much criticised then and since, was published in 1694, and reached its 7th edition in 1878. The influence of the academy on the French language and literature has naturally been in the main conservative, and directed on 'taste' rather than on originality. It boasts on its roll of members most of the eminent French writers, though it rejected La Bruyère, Boileau, and Molière (as a player). Louis XIV. founded the *Académie*

des Inscriptions in 1663, for the immediate object of examining his collection of medals and other antiquities. The third academy in order, the *Académie Royale des Sciences*, was founded by Colbert in 1666. The painter Le Brun founded in 1648 an *Académie de Peinture*, for which he obtained a charter in 1655; and in 1664, Colbert remodelled and established it as the *Académie Royale de Peinture et Sculpture*, with which was afterwards incorporated the *Académie Royale d'Architecture*, founded 1671. All these academies were suppressed by an edict of the Convention (1793); but in 1795, the Directory established a great national association, for the promotion of the arts and sciences, called the *Institut National*. It was at first divided into three classes, and re-arranged in four in 1803. In 1816, Louis XVIII. restored the names of the old academies to the four classes of the Institute: (1) *L'Académie Française*; (2) *L'Académie des Inscriptions et Belles-lettres*; (3) *L'Académie des Sciences*; (4) *L'Académie des Beaux-arts*, the general title, 'Institute of France,' becoming successively modified by the epithet 'Royal,' 'Imperial,' or 'National,' in harmony with the political changes in France. An ordinance of 1832 re-established the old second class as a fifth academy, *L'Académie des Sciences Morales et Politiques*, and this organisation still subsists. Each academy has its own jurisdiction and work, an agency and secretaries; the library and the valuable collections of the Institute are common to the five; the common fund is managed by a committee of ten members (two from each academy), under the presidency of the Minister of Public Instruction. Members are elected by ballot, the election requiring to be confirmed by government, and members of one academy may be elected as members of any or all of the other four. Each member has an annual salary of 1500 francs, and each secretary of an academy 6000. If the members of the *Académie Française* attend all the meetings, their salary is raised to 5000 francs each, and five charged with the compilation of the dictionary get besides 1500 francs. Those engaged on a history of French literature get 2400 francs each. The *Académie Française* meets one hour, the other four academies two hours a week; each has also one public annual sitting; and on the 25th October there is a general public meeting of the whole five. All the academies, with the exception of the first, have a certain number of *académiciens libres*, *associés étrangers*, and *correspondants*; the 'académiciens libres' have only the right of attending the meetings of the academy; the 'associés étrangers' are foreign members.

The following table gives the full complement of members and correspondents for each academy:

					1878			
1.	Académie Française	40						
2.	des Inscriptions et Belles-lettres	40	10	8	50			
	des Sciences	68	10	8	100			
	des Beaux-arts	41	10	10	40			
	des Sciences Morales et Politiques	40	0	0	48			
		229	36	32	238			

The *Académie Française* has the disposal of a prize of 2000 francs each year for eloquence and poetry alternately, and of foundation prizes (1) to 'a poor Frenchman who has done the most virtuous action throughout the year,' and (2) to 'a Frenchman who has written and published the

book most conducive to good morals' in the course of the year. Each year a sum is voted by the French government for the general fund of the Institute, and from this fund are paid the allowances of members, salaries of the secretaries and other officials, and several prizes; also experiments, printing, and other expenses. See Mesnard's *Histoire de l'Académie Française* (1859).

Academies after the Parisian model were soon established in most of the other European capitals. Of these several have attained the rank of national central institutions; as those of Madrid, Lisbon, Stockholm, and St Petersburg. Centralisation of this kind has never been possible in Italy, Germany, or England. Whether working with the sanction and support of the state or as independent associations, academies, when not directly modelled after the French Institute, generally fall into two or three main classes or departments; of which one at least interests itself in mathematics and the natural sciences; another is devoted to philosophy, philology, and history. The members, who in many cases receive a salary, are usually classified as *ordinary*, *honorary*, and *corresponding*. They may choose each for himself a special subject of research, or, as in St Petersburg, have one assigned to them by the government. The results of their labors in their various departments are reported at the regular periodic sittings, and thereafter published by the academy. These papers are in England generally termed *Transactions* (Lat. *acta*, or *commentarii*; Ital. *atti*; Fr. *mémoires*); shorter papers, reports of the sittings, notices to members, correspondence, and the like, appear in the form of a journal, and are commonly known as the *Proceedings* (Fr. *bulletins*, *comptes rendus*). Prizes are customarily established by the academy for work upon new or difficult subjects.

In France, besides the *Institut*, there are numerous learned societies in the provinces which generally bear the name of *Académie*. Spain possesses the *Real Academia Española*, founded at Madrid in 1713, for the improvement of the Castilian language; an academy of history (1738); and another (1817) for the furtherance of mathematics and natural science. The Portuguese Academy was founded in 1779. In Italy, besides the already-mentioned *Crusca*, and the *Del Cimento* at Florence, valuable services have been rendered by the Academy of Sciences at Turin, a private association from 1757 till 1783, when it became a royal institute; the academies at Milan (1838), at Venice (1838), at Padua (1779), at Brescia (1801), and Bologna (1712); the *Società Italiana delle Scienze* at Modena; at Rome the *Accademia degli Arcadi* (1656), the *Accademia de' Nuovi Lincei* (1847); the agricultural *Accademia dei Georgofili* (1752) at Florence; and the Neapolitan *Nuova Società Reale*.

The *Académie der Wissenschaften* of Berlin was founded in 1700 by Frederick I. The first president was Leibnitz, whose extraordinary versatility of genius qualified him for a leading place in all its departments. Under the great Frederick, new life was infused into the academy by the encouragement offered to learned men of all countries to settle at Berlin. Munkertuis was now appointed president, and the academy was reorganised under the four classes of Physics, Mathematics, Philosophy, History and Philology. The famous *Gesellschaft der Wissenschaften* at Göttingen has been in existence since 1752. The academy at Munich dates from 1759; that at Leipzig from 1768. The most notable Austrian academies are the *Kaiserliche Akademie* at Vienna, instituted in 1847; societies at Prague and Cracow; and the Hungarian academy at Pesth. In Belgium, the *Académie Royale* (1773,

1808) holds the first rank.—The Netherlands have an *Akademie van Wetenschappen* (1808); besides learned societies at Middelburg, Utrecht, Haarlem, and Rotterdam.—The national academy of Denmark has published valuable transactions since 1742. Norway has had an academy at Trondhjem since 1760, and another in Christiania since 1837. Sweden possesses two academies at Stockholm for the promotion of science and literature, founded respectively in 1739 and 1786; besides the well-known *Regia Societas Scientiarum* of Upsala.—The Imperial Academy of St Petersburg was planned in 1724 by Peter the Great, but founded by Catharine I. in 1728. Finland has a *Societas Scientiarum*, meeting at Helsingfors.—There is a Servian academy at Belgrade, and a Roumanian one at Bucharest. Constantinople instituted one in 1851, and there is one at Alexandria.

In Great Britain, learned associations are most frequently known as societies. The Royal Society, the Royal Society of Edinburgh, the British Association, and the Social Science Congress, are treated in separate articles. Except in the case of the Royal Irish Academy of Sciences in Dublin (founded 1782), the name academy is in England generally given to institutions existing expressly for the cultivation of the fine arts. The *Royal Academy of Arts* in London was founded in 1768, for the promotion of the arts of design, painting, sculpture, &c. (see PAINTING). The *Royal Scottish Academy* of Painting, Sculpture, and Architecture was founded at Edinburgh in 1826, and received a royal charter in 1838. Similar to these also is the *Royal Hibernian Academy*, incorporated at Dublin in 1803. The *Royal Academy of Music* in London, founded 1823, is an educational institute.

In America, as in Britain, learned societies are not usually termed academies, though many are. The Smithsonian Institution of Washington (q.v.), and the American Philosophical Society at Philadelphia, founded in 1780, are prominent amongst transatlantic learned associations.

The *American Academy of Arts and Sciences* was established at Boston in 1780; it had previously existed in another form, the original institution being due to Franklin. The first volume of its Transactions was published in 1785. The *Academy of Natural Sciences* was founded at Philadelphia in 1812, and commenced its Journal in 1817. The library of this academy is the finest of its kind in America. The *Connecticut Academy of Arts and Sciences* was organised at Newhaven in 1799. The *New York Academy of Sciences*, incorporated in 1818 as the 'Lyceum of Natural History,' possesses a large valuable library, including *Annals of the Lyceum of Natural History*, from 1824; Proceedings commencing in 1873, and Transactions beginning with 1881. The *National Academy* was incorporated by the congress of the United States in 1863, its object being to examine and report upon scientific questions. The *Peabody Academy of Sciences*, at Salem, Massachusetts, was endowed by George Peabody. The *Academy of Science of St Louis*, Missouri, was incorporated in 1857. The *Chicago Academy of Science* (1865), publishes occasional Transactions. The *Pennsylvania Academy of Fine Arts*, at Philadelphia (1805), affords excellent facilities for instruction in the various branches of art. The *National Academy of Design*, in New York, claims to be the foremost school of art in the United States; and the art schools at St Louis, Cincinnati, Chicago, &c. are virtually academies of the fine arts.—Canada has its Royal Society (1882); whilst at Rio Janeiro and other South American capitals there are more or less prosperous academies of literature, science, and art.

The academies of the fine arts alone that exist in

European capitals and important cities, especially in Italy, are too numerous to particularise.

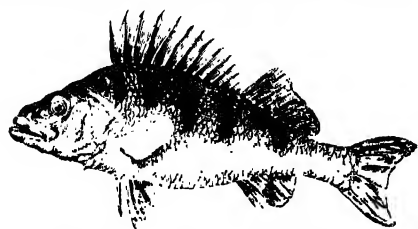
Acadia (*Acadie*) was the name given by the French settlers to Nova Scotia (q.v.), on its first settlement in 1604. When a grant of the peninsula was obtained in 1621 by Sir William Alexander, it was named Nova Scotia in the charter. His attempts to colonise the country on a large scale were defeated by the French. The English claimed the colony by right of discovery—as having been discovered by the Cabots; the exclusive possession of the fisheries proved a further bone of contention. In 1667 it was ceded to France; but the English colonists never recognised the cession, and harassed the French settlers. In 1713 France gave up all claim to the colony: the Acadians mostly remained, though they had liberty to leave within two years, and were exempted from bearing arms against their brethren. A French settlement was formed on Cape Breton, and received the name of Louisbourg; whilst as a result of French intrigues with the Indians, the latter harassed the English. The majority of the Acadians would not take the oath of allegiance, nor would they refrain from abetting underground hostilities against the English. 'The French government,' says Parkman, 'began by making the Acadians its tools, and ended with making them its victims.' Accordingly, in 1755 it was determined at a consultation of the governor and his council to remove them; and to the number of about 18,000, they were dispossessed of their property and dispersed among the other British provinces. This wholesale expatriation, often severely condemned, was not resorted to until every milder resource had been tried. A simple, yet very ignorant peasantry, living apart from the rest of the world, they were ruled by the priest, who taught them to stand fast for the church and King Louis, and to resist heresy and King George. The sufferings of the Acadians form the groundwork of Longfellow's *Evangeline*. See Murdock's *History of Nova Scotia* (1866); Hannay's *History of Acadia* (1879); and Parkman's *Montcalm and Wolfe* (1884).

Acajutla, a small seaport on the west coast of San Salvador, which still has considerable trade, but was formerly much more prosperous.

Acalephæ (Gr., 'nettles'), a term first applied by Aristotle to the jelly-fish tribe, on account of their stinging powers. At a later period the designation was used by Cuvier and others to include the true medusæ or jelly-fishes, *Aceraspæda* (q.v.), the *Lucernaria* (q.v.), and the *Ctenophora* (q.v.), while others have given it a still wider application equal to *Cœlenterata*. The term has now been replaced by a more precise nomenclature. See *Cœlenterata*, *Hydrozoa*, and *Jelly-fish*.

Acanthocephala, a peculiar order of parasitic worms, of cylindrical form, with protrusible hook-bearing proboscis, and without alimentary canal. The order includes several species of a single genus, *Echinorhynchus* (q.v.).

Acanthopterygii, a term due to Cuvier, and



Perch, an Acanthopterygious Fish.

employed to designate one of the principal orders

of bony fishes (see *FISHES*). Literally meaning thorny-winged (Gr. *acantha*, 'a thorn,' and *pteryx*, 'a wing'), the term describes one of the characteristics of the order, namely, the presence of unjointed spinous rays in the dorsal, anal, and ventral fins. Among the common representatives are perch, mullet, mackerel, miller's thumb, gurnard, blenny, and stickleback.

Acanthus, the name given by the Greeks and Romans to the plants sometimes also called *Bran-cursine*, and adopted by Linnaeus as the generic name. *Acanthus spinosus* and *Acanthus mollis*, natives of the south of Europe, are the species best known, and are of considerable interest as having been more largely conventionalised in

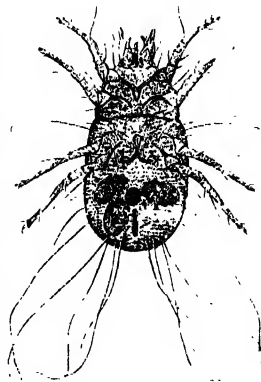


Acanthus spinosus, natural. Ornamental *Acanthus* Leaf.

sculpture and decoration than any other plant. *Acanthus mollis* is said to have furnished to Callimachus the idea of the Corinthian capital. The adherence to this form is simply traditional, since numberless other plants lend themselves equally well to the purposes of the designer. The genus *Acanthus* is the type of the *Acanthaceæ*, an order of *Corolliflorales*, allied to *Scrophulariaceæ*, chiefly tropical, and of no important properties. The majority are mere weeds, but several genera are valued hothouse flowers.

Acapulco, the best Mexican harbour on the Pacific, situated about 180 miles SW. of the capital. The harbour is so well sheltered that 500 vessels may ride safely at anchor close to the granite rocks. The climate is hot and unhealthy, and earthquakes are not infrequent. The chief exports are cochineal, indigo, cocoa, wool, and skin; the imports are cottons, silks, spices, and hardware. Pop. about 3000, mostly Indian half-breeds.

Acarina, or mites, in the wide sense, form a low order of *Arachnida* (q.v.). Most of them are extremely small, the body is all one piece, the mouth parts are modified for sucking or biting, and the organs are generally simple and often degenerate. While their simplicity is partly associated with their frequently parasitic life, some of them appear to be connecting links between worms and arthropodous animals. They are very prolific, some of them by way of parthenogenesis. Of universal distribution, they occur especially where food is abundant—e.g. in decaying animal and vegetable matter, or within and upon other organisms. Many of them form galls on plants. The



Cheese-mite.

food is abundant—e.g. in decaying animal and vegetable matter, or within and upon other organisms. Many of them form galls on plants. The

Cheese-mite (q.v.), the Sugar-mite, the Itch mite (q.v.), the common Harvest-bug (q.v.), the frequent parasite on the human nose (*Acarus folliculorum*, q.v.), the abundant ticks, the water-mites or water-beetles, &c.; the familiar 'red spider' of hot-houses, are exceedingly frequent forms of acarina. An East-Indian species of harvest-mite (*Trombidium tinctorum*) yields a dye. In their destruction of decaying organic matter, mites doubtless act as beneficial scavengers. As abundant and troublesome parasites they are of some importance, while their very diverse modes of life bring about curious instances of structural adaptation and degeneration.

Acarnania, the most westerly part of ancient Greece, separated from Epirus on the N. by the Ambracian Gulf, now the Gulf of Arta; from Ætolia on the E. by the river Achelôis; and washed S. and W. by the Ionian Sea. Its inhabitants were brave, but rude and addicted to piracy and robbery. Along with Ætolia, it now forms one of the provinces of the modern kingdom of Greece. The western part of Acarnania is occupied by a mass of rocky and thickly-wooded mountains rising abruptly from the indented coast. Among the inhabitants, besides the Greeks, are bands of nomadic Kntzo-Wallachs called *Kara gous* ('black cloaks'), who descend from the mountains at the approach of winter, and squat with their herds at the edge of the woods. The chief town is Missolonghi.

Acarus folliculorum, or DEMODEX FOLLICULORUM, is a microscopic parasite allied to the mites, which inhabits the hair-follicles and sebaceous glands of the human skin, also the wax of the ear. It is found most commonly in the skin of the nose, and is present in a large proportion of healthy individuals, but is of no practical importance. It may be seen when present by squeezing out the contents of a sebaceous follicle, mixing with a little oil on a glass slide, and examining under the microscope. It is from $\frac{1}{16}$ to $\frac{1}{8}$ inch in length. The thorax occupies from $\frac{1}{4}$ to $\frac{1}{2}$ of its length, and is furnished with four pairs of rudimentary limbs. See PARASITES.

Accad, or AKKAD, was the SE. division of ancient Babylonia, as distinguished from Sumir, the NW. The Accadians were the dominant people in Babylonia at the time of the earliest records, though they seem originally to have come from the mountain country of Elam. To the Accadians, who were a non-Semitic people possibly allied to the Ugrian stock, the Assyrians attributed the origin of Babylonian civilisation and of the earliest form of cuneiform writing. There was also a city of Accad, one of the four great cities of the 'land of Shinar.' See BABYLONIA.

Acceleration is a term used in the science of Kinematics (q.v.). If a point be moving with variable velocity, its motion is said to be *accelerated*, and the rate of change of velocity is termed its *acceleration*.--For the acceleration of the moon, see MOON; for that of the fixed stars, see STAR.

Accent, in Language, is a special stress of voice laid upon one syllable of a word, by which it is made more prominent than the rest; every word in English has one syllable thus brought markedly into notice. The accented syllable is sometimes indicated by a mark, as *ac'cent*, *fortify*. When the accented syllable falls near the end of a long word, there may be one or more secondary accents,

as in *re'commend*, *subor'dina'tion*. Accent depends upon force of vocal or articulative effort, not upon highness or lowness of pitch. Variations of pitch produce what elocutionists call *inflection*. In English, many nouns are converted into verbs simply by transposing the accent, as *ob'ject* *ob'ject*. It is accent alone, and not quantity, that determines English measures or metres in versification. No rule can be given as to what syllable of a word shall be accented. There seems to be an increasing tendency in our language to throw the accent towards the beginning of words (see RHYME, METRE, RHYTHM).--*Emphasis* is to sentences what accent is to words; it is a stress laid upon some one word or part of a sentence to make it prominent. If accent is syllabic emphasis, emphasis is logical accent.

Accent, in Music, is analogous with accent in poetry. It is one of the elementary requisites of musical art, that in a series of notes, an emphasis or accent should recur with mostly unbroken regularity. The position of this is generally indicated by bars across the stave, the accent being normally on the first note within the measure. A secondary or weaker accent is sometimes placed on the third beat, whether in common or triple time. More frequently than in poetry, the accent is, for the sake of effect, transferred from its normal place. This is always clearly indicated. What is called by some writers the *rhetorical* accent, is the proper adaptation of the accent in vocal music to that of the words. *Accents*, in liturgical services, are the forms of intonation of various portions in definite musical rhythm.

Acceptance is the signification by the drawee in a bill of his assent to the order of the drawer. It consists in the drawee, or some person duly authorised by him, signing the bill. Words may be added signifying his intention; but these are unnecessary, and may destroy the bill, if, for instance, expressing that other means than money will be used to meet the bill. The acceptance may be before the bill has been signed by the drawer, or when it is overdue, or after having been dishonoured. Acceptance is either general or qualified, i.e. expressly varying the terms of the bill as drawn. A qualified acceptance may be conditional, or partial in amount, or local; i.e. restricting places of payment; or qualified in time; or by one or more drawees, but not by all. All acceptances are completed by delivery or notification. See Bills of Exchange Act, 1882; and the article BILL OF EXCHANGE.

Acceptance is also a term in the Scottish law of contract. A contract may commence by an offer, and be completed by acceptance. The offer is viewed as an obligation conditional on the acceptance, but may, before acceptance, be recalled; recall taking place in many cases by the mere lapse of time, according to mercantile customs. The offer may be verbal, by letter, or even tacit, as when goods are sent without an order, or contrary to order, in which case acquiescence is acceptance. The acceptance may be either tacit or express. The word in this sense is not a technical one in the law of England, but the matter to which it relates in that system will be found under CONTRACT.

In the United States, acceptance is used very much as in England. An acceptance may be called *absolute*, when it is a positive engagement to pay the bill according to its tenor; *conditional*, when it is an undertaking to pay the bill on a contingency; *express*, when it is an undertaking, in express and direct terms, to pay the bill; *implied*, when the undertaking to pay the bill is inferred from acts of a character to warrant such

an inference; *partial*, when the undertaking varies from the tenor of the bill; and *qualified*, when the acceptance is either conditional or partial.

Acceptilation (Lat. *acceptilatio*) was a term in Roman law (and adopted in Scots law) for the remission of a debt through an acquittance by the creditor testifying to the receipt of money which never has been paid, or a kind of legal fiction for a free remission. By an obvious transference, the word was used in dogmatic theology for the doctrine laid down by Duns Scotus, and defended by Arminians, that the satisfaction rendered by Christ was not in itself really a true or full equivalent, but was merely accepted by God, through his gracious good-will, as sufficient.

Accessory, or **ACCESSORY**. In the criminal law of England, an accessory is a person who is not the chief actor in a felony, nor even present at its perpetration, but who is in some way concerned, either *before* or *after* the fact. An accessory *before* the fact is one who procures or counsels or commands another to commit a crime, he himself being absent. But mere knowledge that a crime is to be committed is not enough to constitute an accessory, as the principal may go far beyond the counsel given. An accessory *after* the fact is a person who, knowing a felony to have been committed, receives, protects, or assists the felon; but merely suffering the principal to escape is not enough. In unpremeditated offences, there can obviously be no accessories *before* the fact; in all crimes under the degree of *felony* there are no accessories at all, but all persons concerned are held to be guilty as principals. There are no accessories in treason, but all are principals, on account of the heinousness of the crime. Accessories must be distinguished from principals in the second degree, who are present aiding and abetting, and generally receive the same punishment as principals. 19642.

In the Scottish law, 'art and part' is the equivalent to accessory, but it also includes principals in the second degree. No distinction is made between guilt by commission and guilt by accession; but, except in treason, accession after the crime is not recognised in Scotland. The most common form of it is, however, prosecuted under the name of *reset* of the theft.

In the United States, the common law distinction between principals and accessories has been abolished by statute, and every person concerned in the commission of a crime, whether he directly commits the act constituting the offence, or aids and abets in its commission, is a principal.

Accession. In the law both of England and Scotland, property may be acquired by accession, and this accession may be either natural or artificial. The young of cattle and other animals, for example, belong to the person who is the owner of the mother, and the fruits and produce of the earth to the proprietor of the soil; and for the same reason, the gradual addition to lands on the bank of a river belongs to the proprietor of the land receiving the addition. These are instances of *natural* accession. Property, again, is said to be acquired by *artificial* accession, when it is the result of human industry; thus trees planted, or buildings erected, on the ground of another, belong to the owner of the ground itself, and not to the planter or builder.

In the United States, accession is the right to all which one's own property produces; the right to that which is united to it, naturally or artificially, by accretion. If the materials of one person are united by labour to the materials of another, so as to form a single article, the property in the joint product is, in the absence of any agreement, in the

owner of the principal part of the materials by accession. If there be a sale, mortgage, or pledge of a chattel, carried into effect by delivery, and other materials are added afterwards by the labour of the vendor or mortgagor, these pass by accession.

Accession, DEED OF. In the practice of Scottish conveyancing, this is a deed by which the creditors of a bankrupt or insolvent debtor approve of a trust-settlement executed by the debtor for the general behoof, and consent to the arrangement proposed. A creditor may by his actings bind himself to approve of such a trust-deed, but only if equality be preserved and all creditors consent. A non-acceding creditor may at any time upset the trust-deed by applying for sequestration. See **BANKRUPTCY**.

Accidence is the part of Grammar which treats of the inflection of words. See **INFLECTION**.

Accidental Colours are the imaginary complementary colours (not caused by light, but due to subjective sensation; see **COLOR**) which are seen when, after looking fixedly at a bright-coloured object, the eye is turned to a white or light-coloured surface. If the object was red, the accidental colour will be green. Blue corresponds in like manner to yellow.

Accidentals, in Music, are signs of chromatic alteration of the notes, differing from the Signature (q.v.) in applying only to particular notes, and not extending their effect beyond the bar in which they occur, or according to others, the first note of the next bar. They indicate a temporary change of key. They are five in number; the sharp (#), the double sharp (x), which raise the note to which they are prefixed a semitone and a tone respectively; the flat (b) and the double flat (bb), which lower it correspondingly; and the natural (n), which annuls the effect of preceding flats or sharps, whether accidental or in the signature.

Accidents, in Logic or Philosophy, are opposed to Essentials, or to Substance. An accident is a property of an object which may be modified, or even be altogether abstracted, in thought or reality, without the object ceasing to be essentially what it is. For the relation of accident to substance, and of attribute to species, see **PREDICABLES**, **SUBSTANCE**.

Accipitrés, a term applied by Linnæus to Birds of Prey (q.v.), such as the hawk (Accipiter). The order is now more generally named **Raptores**, or more technically, **Actomorphæ**.

Acclimatisation is that process whereby animals or plants become adapted to, and so thrive in a climate different from that in which they are indigenous. The process, of course, varies widely, according to the amount of difference between the old and the new climate. In cases where the difference is extreme, important changes take place in the constitution, and are often attended with certain diseases described as 'diseases of acclimatisation.' Thus, Europeans settling in tropical parts are liable to disease of the liver; while natives of tropical lands, when resident in England, are exposed to pulmonary disease. The power of bearing changes of climate is greatest in the Anglo-German race, and usually bears a direct ratio to the intellectual development of a race. Some regions have, however, as yet baffled European colonisation. Civilised people display greater ingenuity and strength of will than savages in accommodating themselves to changes of climate, by making careful corresponding changes in their mode of life. Ulloa and Humboldt assert that persons of and above middle age best stand transportation to tropical

climates. Among animals, we find great powers of adaptation to various climates in the horse, dog, cat, and rat; and among plants, in the various cereals, in potatoes, and in several weeds common to almost all climates; but there seems to be a limit to the power, at least as soon in the individual. Acclimatisation beyond a certain point is the work of son generations. Almost all the domestic animals now commonly spread over Europe, and even in high northern latitudes, were originally natives of warm climates. The change produced by the acclimatising of animals may be either an improvement or a deterioration; of the latter, we have an instance in the Shetland pony; of the former, we see an example in the merino sheep of Spain. The reindeer may serve as an instance of the want of the faculty of becoming acclimatised; removed from the cold north to the fertile valleys of a temperate climate, it degenerates and dies. On the other hand, the horse, which is native in the East, arrives at its highest development in England; and the Syrian sheep, brought northward as far as Spain, becomes remarkable for its fine fleece. Spain has a climate much warmer than that of Silesia and Pomerania; and yet the merino sheep bred in these countries have become superior to their ancestors imported from Spain. This is a proof that art may do very much in modifying the influences of climate. Silkworms, brought from China first into Italy, have been acclimatised not only in the south of France, but even on the coast of the Baltic. Recently, attempts have been made to acclimatise in France the llama, the vicuña, and the alpaca of Peru, and with some success in the last instance, as alpacas have been found to thrive pretty well in the Pyrenees.

In America, some interesting experiments in naturalisation have been made. Many European birds have been set at liberty by local societies, and a few species promise to become Americanised. The camel breeds well in a half wild state in Nevada and Arizona; while alpacas, though repeatedly tried, have nowhere thriven. Ostrich-farming promises well in the Argentine Republic, but the Californian experiments with African ostriches have been reported to be failures. Various Australasian trees, notably the Eucalyptus, thrive wonderfully in California, and successful experiments have also been made with them in the cotton-growing states; the tea-plant also grows well in various parts of the United States. The camel does well in Australia, and has been found highly useful in the desert tracts. Several species of trout, salmon, and other fishes have been successfully naturalised in Australasia, notably in Tasmania and New Zealand. America and Australia alike have become the abodes of many noxious weeds from Europe. The English sparrow is a great nuisance in North America; the English rabbit is extremely destructive in Australia and New Zealand. In like manner, the *Anacharis canadensis*, a harmless water-plant in America, has proved an annoying obstruction in many British canals. On the other hand, in the island of Arran and elsewhere interesting and successful experiments in acclimatisation, especially of Australian plants, have been made. In the case of one species, Eucalyptus or gum-tree, the rate of growth has been even greater than in Australia. The introduction of coffee into the West Indies and of cinchona into India offer further examples of successful acclimatisation. It has been very generally believed that plants may become gradually inured to a climate so different from that to which they have been accustomed, that if they had been at once transferred to it they would have perished. On the other hand, it is maintained that each species of plant has certain limits of

temperature within which it will succeed, and that alleged instances of acclimatising have been merely instances of plants formerly supposed to be more delicate than they really were. But as it is certain that different varieties of the same species are often more and less hardy, it would seem that in the production of new varieties by seed, there is still a prospect of the acclimatising, to a certain extent, of species of which the existing varieties are too delicate to grow well in the open air. Of Acclimatisation Societies, the best known is the Paris *Société d'Acclimatation*. The progress which has been made during the past few years in the science of medicine and in sanitation, renders it more probable that attempts made by Europeans to become acclimatised in tropical countries will be successful.

Biologically considered, acclimatisation is part of the general process of modification of organism by environment. When the conditions in the new home are approximately similar, no fresh changes will be imprinted on the organism, and the survival of the imported form is obviously natural. Such cases are instances simply of dispersion, generally by human selection, and hardly of acclimatisation in the strict sense. At the other extreme, the sum of the external forces, or 'natural selection,' may be predominantly adverse, the consequent changes pathological, the result non-survival. The term acclimatisation should thus be restricted to cases between these two extremes, where the plastic organism becomes actively and passively adapted to the new environment. That modifications do take place in consequence of a change of climate and other external conditions, has been recognised from the time of Hippocrates, but how soon these may become really hereditary is still a matter of much dispute. See CLIMATE, DISTRIBUTION, DOMESTICATION, ENVIRONMENT, HEREDITY, PISCICULTURE; Darwin's *Animals and Plants under Domestication*; works on anthropology by Tylor and Waitz; H. Weber's *Climatic Therapeutics*.

Accolade, an essential part of the ceremony by which knighthood was and is conferred. Originally, the grand-master of the order, in receiving the neophyte, embraced him by folding the arms round the neck (*ad collum*). Later, a blow was given with the fist or the flat of a sword (perhaps as the last the knight should suffer to pass unavenged). Now, the sovereign gives the accolade by laying a drawn sword on the shoulders of the kneeling knight-elect, and bids him rise, addressing him with 'Sir' prefixed to his Christian name. See KNIGHT.

Accommodation, a name given in theological phraseology to a method in Scripture interpretation which explains the form as not necessarily more than the vehicle by which divine and spiritual truth is conveyed to the human understanding. Without such an adaptation, the divine revelation would not be intelligible to man, and thus much of the symbolic method, especially of the Old Testament, is merely a compromise with human weakness. The method of Jesus, in his teaching, is also claimed as an example of accommodation, in his selection of familiar natural phenomena and ordinary human experiences, as the means of conveying to the mind abstract spiritual truths. The secondary fulfilments of prophecy, and the New Testament explanations of the manner in which these were seen in the life of Jesus, are supposed by some to be accommodations, to which Jesus and the writers of the Gospels assented for the sake of their didactic value.

Accommodation, in Commerce, is either a loan of money directly, or the service rendered when one becomes security for a sum advanced to

another by a third party, as by a banker. For Accommodation Bill, see BILL.

Accompaniment, in Music, is the assisting or aiding of a solo part by other parts, which may consist of a whole orchestra, or a single instrument, or even subservient vocal parts. It is either *ad libitum*, when it may be omitted at pleasure, or *obligato*, when it forms an integral part of the composition. It serves to support and beautify the solo part, and therefore should not predominate, but merely assist to place the solo part in its brightest light. In this point of view, modern composers have often erred by making the accompaniment too full, and causing it to stand out so independent, that the solo part is often, as it were, entirely lost. This abuse takes place mostly in vocal music; and not only is the effect destroyed, but the vocal organ of the singer is frequently ruined. This is a result, though not a necessary one, of an increasing aim towards a polyphonic style, in which the parts are all of nearly equal value and importance; and it is undoubtedly in this style that the greatest music has been written. The works of Richard Wagner are notable as containing many passages in which the voice is overwhelmed by the orchestral accompaniment, and but few singers have ever been able to cope with this difficulty. The operas of Mozart may probably be regarded as striking the balance most happily on this point. In accompaniment, the composer should keep three principal points in view: harmony, rhythmical figure, and suitable choice of instrumentation, in respect to volume and character of tone; but all must be subservient to the ruling character of the solo part. The accompaniment should, above all things, by its certainty and firmness, prevent wavering. Good accompaniment is as creditable as solo playing; and all qualified orchestras view it as of great importance. In the scores of the older masters, especially Bach and Handel, frequently very faint indications are given of the parts of the accompaniment beyond a *figured bass*—i.e. the bass part with certain recognised figures written above it—indicating the harmony to be played to each note. At that time, the art of playing from this was in general practice among musicians; but it is now necessary to have these parts written out. The work of supplying *additional accompaniments* to these scores, adapted for the modern orchestra, has been performed by numerous eminent musicians, Mozart, Mendelssohn, and others, the most successful of all being probably Robert Franz.

Accordion, a musical instrument invented in 1829 by Damiani, of Vienna. It consists of a small hand-bellows, with a keyboard on one side, containing from five to fifty keys, acting on free metal reeds, so arranged that each sounds two notes, the one in expanding, and the other in contracting the bellows. Its capabilities are extremely limited, but it is in fact little more than a toy.

Accosted, in Heraldry, a term often applied to a bend, chevron, or fess, placed between two charges. See COTISE.

coucheur. See MIDWIFERY.

Account, in Law, means a statement of money transactions showing a balance due by one party to another, or it may show only goods supplied or rendered by one party, in respect of which a balance is due to the other. In England, where the parties have agreed to the balance, this is called 'an account stated,' or, if the parties are trustee and beneficiary, it is called a 'settled account' which is of course quite different from that in which the word 'settled' is used of money accounts settled by agreement. In Scotland, a 'fitted account' is one in which the privileges of a document *in re mercatoria*—i.e. it does not require to be signed before witnesses. It is often stipulated, as in the case of a cash-credit, or of a bank and its agent, that an account stated by the official of the bank shall be conclusive, but this affords only a *prima facie* case. Even where accounts have been docketed, errors of calculation can be corrected, and if the settlement has been obtained by misrepresentation or concealment, it may be set aside. There is in Scotland a triennial prescription of tradesmen's accounts (see PRESCRIPTIONS). The action by which in Scotland a party liable is made to account, is called 'count reckoning and payment.' In England, such actions are generally brought in the Chancery Division. Under the Legacy and Succession Duty Acts, executors and others have to file statutory accounts showing the position of the estate. The Bankruptcy Law makes the failure of a tradesman to keep proper accounts of his business a criminal offence. Corporations are generally required by public law to make a certain publication of accounts; in the case of life-assurance companies, a very elaborate form of return or account is required by Mr Cave's Act of 1870. Officers appointed by the court, such as judicial factors, are bound to lodge annual accounts in court. The *Accountant general* was in 1726 made (see INTEREST) responsible for the accounts of money paid into the Court of Chancery, but in 1872 this duty was transferred to the Paymaster-general.

Account Current, Account Sales. See BOOK-KEEPING.

Accountant. Most public companies, such as banks and railway companies, have an officer called an accountant, whose duty it is to take charge of the books and accounts of the concern, and to make up periodical statements and balance sheets. It is only in recent years that the profession of an accountant has come to be recognised as a special branch of business, its functions having been usually performed, as they still sometimes are, by lawyers and agents. The business of an accountant cannot well be very strictly defined, but it may be stated generally as falling under two divisions: (1) The management or realisation of estates, whether of bankrupts or others; and (2) all matters involving the investigation of business books, as auditing the books of private firms or public companies, and making up balance sheets, statements of all kinds, and reports. There are several societies of accountants incorporated by royal charter, and a member or fellow of one of these is termed a chartered accountant (C.A. or F.C.A.). The principal society in England is 'The Institute of Chartered Accountants in England and Wales,' incorporated in 1880; and in Scotland there are chartered institutes in Edinburgh (1854), Glasgow (1855), and Aberdeen (1867).

Accra, since 1875 capital of the (British) Gold Coast Colony, and after Cape Coast Castle, the most important town on the coast, lies slightly to the W. of the long. of Greenwich. It is a healthy place, much attention being paid to the drainage and water-supply, and has considerable export trade in palm-oil, ivory, gold dust, indiarubber, monkey skins, gum copal, and camwood. The town has telegraphic communication with England, the Niger, and the French and Portuguese settlements to the south. Pop. about 10,000.

Accrington, a manufacturing town of Lancashire, incorporated as a municipal borough in 1878. It lies in a deep valley, surrounded by hills, 22 miles N. of Manchester, and 5½ miles E. of Blackburn. The oldest church dates from 1554, and was rebuilt in 1763. The town-hall (1857) is a handsome building, and there is a neat market-hall.

The industries are mainly calico-printing, Turkey-red dyeing, iron-founding, with coal-mining in the neighbourhood, and chemical works. Pop. (1841) 8719; (1881) 31,435; of whom 6000 are employed in the cotton manufactures.

Accum, FRIEDRICH, born in Westphalia in 1769, came to London in 1803. He is known in this country chiefly on account of his *Practical Treatise on Gas-light*, and other chemical works. He greatly promoted the introduction of gas-lighting. In 1822 he became a professor in a technical institute in Berlin, where he died in 1838.

Accumulation is a legal term applied to the putting by of interest, or rents, and converting them into capital by investment, of which the income is again capitalised. By the Thellusson Act (q.v.) of 1790, it is forbidden to accumulate income for a longer period than the life of the trustor or settlor, and twenty-one years thereafter. This act applies to movable estate in England and Scotland, and by the Rutherford Act, 1848, the prohibition was extended to the rents of land in Scotland. If the direction is given to accumulate for a longer period, the settlement is not void, but is given effect to so far as permitted by law. It is usual in settlements to direct the accumulation of income during the minority of the children after providing for their maintenance. Accumulation is also applied in Scotland to the charging of compound interest. Such accumulation is permitted on bankers' accounts periodically settled; on India accounts by custom; on the cash-accounts of judicial factors and law-agents; and in certain cases of fixed commercial usage. See INTEREST.

Accumulator. In such pieces of hydraulic apparatus as hydraulic cranes or hoists, unless the height of the available column of water, or head-pressure, as it is called, is considerable, the necessary amount and constancy of pressure is obtained by means of an accumulator. This usually consists of a dead weight acting by means of a plunger on the water column. Sometimes, however, steam is used to put on the required pressure, in which case the arrangement is called a steam accumulator. In Electricity, the accumulator is an arrangement by which electrical energy can be stored for a considerable time in some potential form, so as to be used at will for the production of electric currents. See ELECTRICITY.

Acceldama (Chaldee, 'field of blood'), the name given to the potter's field bought by the priests as a burial-place for strangers, with the money which Judas had received for betraying Jesus, and which, in the horror of his repentance, he flung at their feet before hanging himself.

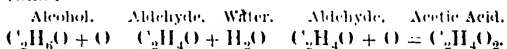
Accephala (Gr., 'headless'), a term used from the time of Aristotle in reference to the class of bivalve molluscs or Lamellibranchs (q.v.). It has in the main retained its application, though some forms which it once included, such as the sea squirts in Cuvier's classification, have been removed to other divisions.

Acer and Aceraceæ. See MAPLE.

Acerra, an ancient city of Southern Italy, 9 miles N.E. of Naples by railway. It has a cathedral and seminary. The country around is fertile, but malarious. Pop. (1881) 14,121.

Acetal, $C_2H_5(OC_2H_5)_2$, is a colourless liquid, of an agreeable odour, and a flavour said to resemble that of the hazel-nut. It is one of the products of the slow oxidation of alcohol under the influence of finely divided platinum, or of chlorine, or of dilute sulphuric acid and peroxide of manganese. Its specific gravity is '821, and it boils at 221° F. (105° C.). It yields various reactions and products of interest in organic chemistry.

Acetic Acid, the sour principle in vinegar, is the most common of the vegetable acids. If alcohol, diluted with water, be mixed with a ferment such as yeast, and exposed to the air at or a little above its ordinary temperature, it is rapidly converted into vinegar or acetic acid. The views held by Liebig regarding the part that wood shavings, sand, ash, &c. play in condensing oxygen, and transmitting it to the alcohol, are now supplanted by those of Pasteur, who maintains that the true acetifying matter is a very minute mycoderma—a special vegetable organised being. It is impossible to conceive a more simple form of vegetation, consisting of extremely minute spores arranged in chains; each spore having a mean diameter not exceeding 17th of an inch, and the length being about twice as great. The rapidity of the development of the spores, under favourable circumstances, is almost inconceivable; and the power which they possess in fixing the oxygen of the air, and of transmitting it to the alcohol, and of establishing an incomplete combustion of the latter, is no less wonderful. A surface of a square yard covered with this plant, is able, in the course of 24 hours, to fix the oxygen of more than 1000 quarts of air. The temperature of the surface of the fluid at which this slow combustion is proceeding is considerably raised, and often remains for several days at 21° or 25° F. (12° or 14° C.) above that of the surrounding air. The process which has just been described bears a very close analogy to the respiratory process, the oxygen of the air being in one case fixed by minute vegetable cells, and in the other by the blood corpuscles. The change is accompanied by the absorption of oxygen, one atom of which combines with two of hydrogen to form water, aldehyde being left. Further oxidation then takes place, acetic acid being formed thus:



From the mode in which acetic acid combines with bases to form salts, it is evident, that one atom of the hydrogen differs from the other atoms in being replaceable by a metal or an alcohol radical (as ethyl, C_2H_5), and on this account acetic acid is called a monatomic acid, and its formula is usually represented as $HC_2H_3O_2$; that of acetate of potash being $KC_2H_3O_2$, and of acetate of ethyl, $C_2H_5C_2H_3O_2$. A striking experiment may be made illustrating the mode in which alcohol is converted into acetic acid. If slightly diluted alcohol be dropped upon *platinum-black*, the oxygen condensed in that substance acts with great energy on the spirit, and acetic acid is evolved in vapour. Here the whole office of the platinum is to determine the oxygen of the air and the hydrogen of the alcohol to unite. In the commercial processes for manufacturing vinegar, some vegetable substance containing nitrogen (one of the albuminous principles) takes the place of the platinum-black, and determines the same change. Pure acetic acid is a cry-stalline solid at ordinary temperatures. It is obtained by distilling dry acetate of potassium and sulphuric acid:

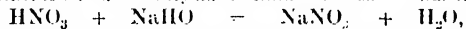


The anhydride of acetic acid (see ANHYDRIDES) is formed by the action of chloride of acetyl on acetate of potassium. It has the composition $(C_2H_3O)_2O$, and unites with water to form acetic acid. The salts of acetic acid, called ACETATES, are numerous and important in the arts. The most important is acetate or sugar of lead (see LEAD). For the commercial processes of manufacturing acetic acid, see VINEGAR.

Acetones, or KETONES, are the aldehydes of secondary alcohols (see ALCOHOL). Thus secondary

undoubted acids that contain no oxygen; and silex, or flint, which, being insoluble, neither tastes sour nor reddens litmus-paper, is held to be an acid because it combines with bases and forms compounds like acknowledged acids. The oxygen acids, which are by far the most numerous class, are formed of elements (sulphur, nitrogen, chromium, &c.) with two or more equivalents of oxygen. The elements that form the strongest acids with oxygen are the non-metallic, and most of them have more than one stage of acid oxidation. Thus sulphur unites with oxygen to form two oxides, SO_2 and SO_3 , which, in combination with water, yield respectively sulphurous and sulphuric acid. Similarly, arsenic forms two oxides, As_2O_3 and As_2O_5 , corresponding to arsenious and arsenic acids. The higher stage of oxidation forms the stronger and more stable acid. All metals, except arsenic, that form acids with oxygen, have also, at a lower stage of oxidation, one or more oxides. To these inorganic acids containing oxygen must be added the organic acids, composed of carbon, hydrogen, and oxygen. Belonging to this extensive group are oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$; acetic acid, $\text{HC}_2\text{H}_3\text{O}_2$; and formic acid, HCO_2 . There are also acids found in animal fluids, or resulting from their decomposition, which contain nitrogen in addition to the three elements above named; such is uric acid, $\text{H}_2\text{C}_4\text{H}_2\text{N}_2\text{O}_6$. The *hydrogen acids* are formed of hydrogen and a radical, either simple or compound. The most important of these, and the type of its class, is hydrochloric or muriatic acid, HCl ; others are hydroiodic (HI) and hydrocyanic (HCN) acids. As all acids, however, even oxygen acids, possess acid properties—i.e. combine with bases—only when in combination with water, a new view of the constitution of acids now prevails, which makes hydrogen the real acidifying element in all acids. Thus, instead of considering vitriol as a compound of sulphuric acid and water, $\text{SO}_3 + \text{H}_2\text{O}$, the hydrated acid is held to be the real sulphuric acid, and its radical formula to be H_2SO_4 . It thus becomes analogous to hydrochloric acid, HCl . This view has not only the advantage of bringing all acids into one class, but makes the theory of their combination with bases and of their capacity of saturation uniform and simple. Hence has arisen the most general definition of an acid—viz. that 'acids are salts of hydrogen.' A more intelligible definition to ordinary readers is that which is adopted by Frankland, in which an acid is described 'as a compound containing one or more atoms of hydrogen, which become displaced by a metal when the latter is represented to one compound in the form of a hydrate.' Thus nitric acid and sodium hydrate yield nitrate of soda and water:

Nitric Acid. Sodium Hydrate. Nitrate of Soda. Water.



in which reaction the hydrogen of the nitric acid is replaced by the sodium of the sodium hydrate (or soda), and as only *one* atom of hydrogen is replaced, nitric acid is said to be *monobasic*. When an acid admits of the displacement of two atoms of hydrogen, it is termed *basic*—as tartaric, oxalic, and sulphuric acid; and when three atoms can be replaced—as in common phosphoric acid, H_3PO_4 , in which H_3 may be replaced by K_3 or Ag_3 , the acid is termed *tribasic*. The more important acids are included in the following list:

Acids containing no oxygen: Hydrochloric, HCl ; hydrobromic, HBr ; hydroiodic, HI ; hydrocyanic, HCN ; hydrosulphuric or sulphuretted hydrogen, H_2S .

Inorganic acid containing oxygen: Boracic, H_3BO_3 ; carbonic, H_2CO_3 ; chromic, H_2CrO_4 ; hypophosphorous, HPIPO_2 ; nitric, HNO_3 ; phos-

phoric, H_3PO_4 ; phosphorous, H_2PHO_3 ; sulphuric, H_2SO_4 ; sulphurous, H_2SO_3 .

Organic acids: Acetic, $\text{HC}_2\text{H}_3\text{O}_2$; benzoic, $\text{HC}_7\text{H}_5\text{O}_2$; citric, $\text{H}_3\text{C}_6\text{H}_7\text{O}_7$; gallic, $\text{H}_4\text{C}_7\text{H}_5\text{O}_3$; lactic, $\text{HC}_3\text{H}_5\text{O}_3$; salicylic, $\text{HC}_7\text{H}_5\text{O}_3$; tartaric, $\text{H}_2\text{C}_4\text{H}_2\text{O}_6$.

The most characteristic inorganic acids (hydrochloric, nitric, phosphoric, sulphuric) are used in medicine in a very dilute condition as tonics and astringents, and to allay thirst in fevers. They corrode the teeth, however, and if long administered tend to disorder digestion; so they must be used with caution. Most of the group have special, some (as hydrocyanic, oxalic) extremely poisonous actions. The stronger acids, when concentrated, are powerful caustics.

Aci Reale, a town of Sicily, in the province of Catania, 50 miles SW. of Messina by rail. It lies at the foot of Mount Etna, on the coast, where the small river Aci enters the sea. The town contains (1881) 22,431 inhabitants, employed chiefly in linen and cotton weaving, in the production of filigree work, and in the cultivation of the vine, hemp, and flax. Aci Reale is famed for its mineral waters, and for the cave of Polyphemus and the grotto of Galatea in its vicinity.

Acis, in Ovid's account, a son of Panus, beloved by the nymph Galatea, and through jealousy killed by Polyphemus the Cyclops. He was crushed under a huge rock, and his blood, as it gushed from beneath the rock, was changed by the nymph into the river Acis, at the foot of Mount Etna.

Ackermann, RUDOLPH, a native of Saxony (born 1764, died 1834), came in 1795 to London, where he opened a print-shop in the Strand. He introduced lithography as a fine art into England, and was the originator of the 'Annals' (q.v.), which he commenced by his *Forget-me not*, published in 1823 and following years. Among the numerous illustrated works published by him may be mentioned his *Repository of Arts, Literature, and Fashions* (1809-28), and works illustrating London, Westminster Abbey, Oxford, and Cambridge. He greatly promoted engraving in England, and showed great enterprise in various departments of industry.

Acland, HENRY WESTWORTH, regius professor of medicine in the university of Oxford, was born in 1815, from Harrow proceeded to Christ Church, Oxford, and, having obtained an All Souls fellowship, in 1848 took his M.D. Ten years later, he became professor. His works include a *Memoir on the Visitation of Cholera in Oxford in 1854*, and *Village Health*, published in 1884, in which year he was made K.C.B. He attended the Prince of Wales as honorary physician in his American tour in 1860, and his numerous distinctions include honorary degrees, decorations, and memberships of royal commissions and of scientific societies at home and abroad.

Aclinic Line is a name for the magnetic equator, which cuts the terrestrial equator, inasmuch as on that line the magnetic needle has no dip, but lies horizontal. The aclinic line is irregular and also variable. *Aclinic* is from the Greek words signifying 'not bending.' See MAGNETISM, DIPPING-NEEDLE.

Acne (probably a corruption of Gr. *akmé*, 'a point') is an important skin disease. It is placed by some dermatologists in the order Pustule, and by others in the order Tubercula, which includes solid, hard elevations of the skin, much larger than Papule. The sebaceous follicles of the skin (q.v.) are the primary seat of the affection. Their natural secretion accumulates in their interior, and there is at the same time a tendency to inflammation of the

follicle and surrounding tissue. It is by no means rare to find on the face and shoulders of young persons about or above the age of puberty a number of black spots, each of which is placed on a slightly-raised pale base. These black points are called *comedones*. Pressure at the base occasions the expulsion of a little, elongated, spiral, white mass, with a black point or anterior end, commonly but erroneously regarded as a worm; though in the midst of the white mass of sebaceous matter, a parasite, *Acarus folliculorum* (q.v.) is occasionally found. Interspersed are other spots, with the base more raised and inflamed, which become more or less perfect pustules, each of which rests on a comparatively large red base. Around some of the inflamed follicles, conglobated lymph (to use the old phraseology) is thrown out, and a small hardened mass is the result. According as one or other of these appearances preponderates, we have different varieties of this disease. When the pustule is the most striking feature, the affection is called *Acne simplex* or *vulgaris*; when the black points abound, it is *Acne punctata*; and when there is decided induration, it is *Acne indurata*. We have already mentioned the age at which this affection commonly occurs: it is never seen in children, and is rare in aged persons.

As long as there is no inflammation, the treatment simply aims at favouring the escape of the contents of the sebaceous follicles, by rubbing the face and other affected parts with cold cream at bedtime, washing on the next morning with soap and water, and vigorous friction with a towel or a piece of flannel. When acute inflammation is present, and the pustules are very tender, there is no better application than tepid water, with or without a little gelatine in solution; and subsequently the ointment of the hypochloride of sulphur has been found useful by Wilson and others. *Acne indurata*, which is the least tractable of the three forms, is sometimes benefited by the application of fly-blisters. In all these cases, the state of the digestive and sexual organs must be carefully attended to.

ACNE ROSACEA, also called Rosacea and Gutta Rosea, is so different from the forms of acne above described that it is regarded by most authorities as a distinct disease. It usually first appears at or near the end of the nose: and in some cases it is confined to the nose, while in others it extends to the cheeks, forehead, chin, or even to the whole face. The skin in the part affected assumes a deep red colour, usually transient at first, but returning either on no special provocation, or in consequence, apparently, of some gastric or other disturbance, and after a time becomes permanent; pimples resembling those of *Acne simplex* may appear, but are associated with itching and burning sensations not present in the ordinary forms of acne. The skin of the diseased part, in some cases, is irregularly swollen, and may become enormously hypertrophied, especially that of the nose. In such cases, it is marked with blue or red streaks, caused by congestion and enlargement of the capillaries; the whole surface, in a severe case, presenting a very disagreeable and repulsive appearance. This affection is no doubt often a result of intemperate living, but it may occur in persons of regular habits of life. Disorder of the digestive system is so often associated with it, as to exclude the idea that the combination is accidental, and the skin disease may often with great probability be referred to gastric disturbance as the exciting cause. In women, however, it is very frequently associated rather with disorder of the menstrual functions. The disease is confined almost exclusively to persons in middle or advanced life, and women are especially liable to it about the period in which what is popularly known as the

'change of life' occurs: moreover, it has occasionally been observed to be hereditary.

The general treatment must be governed by the digestive or menstrual disorders associated with it; and a nourishing but bland and non-stimulating diet—above all, abstinence from alcohol—is of great importance. In the early stages, and in irritable forms of the disease, the local treatment should be soothing. Emollient lotions, such as emulsion of bitter almonds, cream, glycerine, a bismuth and calamine lotion, &c. may be occasionally used during the day, and in severe cases a bread poultice may be applied to the face at night. When the affection becomes indolent, the emollients should be gradually replaced by stimulating applications, such as Eau de Cologne, or a solution of corrosive sublimate in alcohol, in the proportion of from one to two grains in the pint; and at a still later stage, a lotion or ointment containing sulphur is often useful. When the capillaries become enlarged, they must be destroyed by incisions or caustics; if the skin be much hypertrophied, removal or cauterisation may be necessary to effect any improvement.

Acemeta (Gr. *akoinētai*, 'sleepless ones'), a congregation of monks founded in 460 near Constantinople, whose peculiarity it was, by means of alternating choirs, to keep divine service going on day and night without intermission in their monastery. They ceased to exist in the 6th century.

Acolytes (Gr. 'followers') were the young clerics who assisted the bishops and priests in the performance of religious rites, lighting the candles, presenting the wine and water at the communion, and the like offices. They were considered as in holy orders, and ranked next to sub-deacons. These services have, since the 7th century, been performed by laymen and boys, who are improperly called acolytes; but in the Catholic Church, aspirants to the priesthood are still at one stage consecrated as acolytes. See ORDERS (HOLY).

Aconcagua, the highest peak of the Andes (q.v.), rising to a height of 22,867 feet, according to Gussfeldt's measurements in 1883. The mountain, which is an extinct volcano (though this has been disputed), is about 100 miles ENE. of Valparaiso, on the frontier of Chili and the Argentine Republic. It gives name to a Chilean province.

Aconite (*Aconitum*), a genus of Ranunculaceæ (q.v.), having five petaloid sepals, of which the



Monk's-hood (*Aconitum napellus*):
a, fruit; b, root.

upper one is helmet-shaped: and two hammer-headed petals (nectaries) concealed within the

helmet-shaped sepal. The fruit consists of 3-5 follicles. *A. napellus*, the common Wolf's-bane or Monk's-hood, often cultivated in flower-gardens for the sake of its erect racemes of blue flowers, is a doubtful native of England, but common in some parts of Europe. The roots are fusiform and clustered. The root and whole plant are very poisonous, containing an alkaloid, called *Aconitin*, (q.v.). An aconite, sometimes called *A. Stoeckianum*, but generally regarded as a variety of *A. Canadense*, was brought into great repute on the Continent during last century by Dr Stoeck, an Austrian physician, and is still cultivated for medicinal use. The virulent *bikh* poison of India, equally fatal in its effects whether introduced into wounds or taken into the stomach, is prepared from the roots of several species. *A. album*, or white-flowered monk's-hood, a native of the Levant, and *A. lycoctonum*, yellow-flowered monk's hood, or wolf's-bane, a native of the Alps, are not infrequent in our flower gardens.

Aconitin, the active principle of the aconite or monk's-hood, is one of the most potent poisons known, so small a quantity as $\frac{1}{10}$ th of a grain of the pure alkaloid having nearly proved fatal. Its recognition in poisoning cases is a matter of difficulty, owing to the small amount necessary for the purpose, but there are tests by which it may readily be recognised. It was the drug employed by Dr Laumon in the murder by poison for which he was executed in April 1882. When applied to the eye in even very dilute solution, it causes a sensation of intolerable heat and tingling, the pupil at the same time contracting. This tingling, associated with numbness, is felt when a piece of aconite root is chewed, and on account of this peculiar property, aconitin, or a preparation of aconite, is extensively used in the treatment of neuralgia, rheumatism, and toothache.

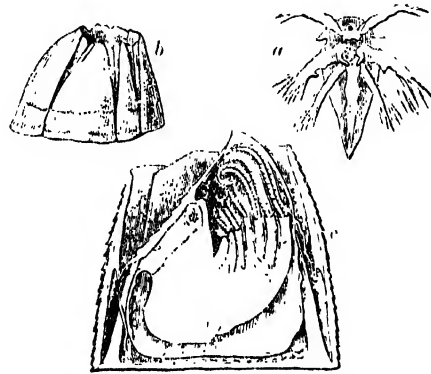
Acorn. See OAK.

Acorn-shells (*Balanus*), a genus of Cirripedes (q.v.), in the class Crustacea. The classical title refers to that remote resemblance to acorns which their popular name also records. They occur in great abundance incrusting the rocks between high and low water mark, and are exceedingly familiar objects. At first sight, and in their adult form, all cirripeds are so unlike crustaceans, that even Cuvier regarded them as molluscs. In 1823, however, their true nature was detected by Vaughan Thompson, who observed the young forms to be free-swimming, and to exhibit characters which stamp them at once as crustaceans.

Structure. The common sessile acorn shell may be briefly described in Huxley's words as 'a crustacean fixed by its head, and kicking its food into its mouth with its legs.' The body is enveloped in a fold of skin, or mantle, which forms round about the animal a conical protective shell of six pieces, and a fourfold movable lid. When the animal is active (only, of course, under water), six pairs of curl-like double legs may be seen alternately protruded and retracted through the valvular opening of the shell. These are borne on the thorax of the animal, and serve to brush the floating food down to the mouth, where it is seized and masticated by the three pairs of jaws. The abdominal portion of the animal is degenerate, and the characteristic crustacean jointing is at best indistinct. Since the animal really stands on its head, the single pair of antennae are located on the middle of the base or lower surface, and are extremely reduced. The attachment is effected by the hardened secretion of complex cement glands, which probably represent modified excreting organs. The special sense organs degenerate, but the nervous system is well developed, and the surface of the legs

seems to have a general tasting sensitiveness. The alimentary canal is in no way peculiar; and though no heart has been demonstrated, the blood has a definite course. Respiration must be largely effected by the ceaselessly waving legs, but there are also folded plates on the inside of the mantle which may represent special breathing organs. The acorn-shells are hermaphrodite, and the eggs are attached to the folded plates just mentioned. When the young larvae free themselves from their egg-cases the shell is opened, and the legs cease to kick till they effect their escape.

Life history.—The contrast between the sessile adults and the free-swimming young is very striking. The first larval stage is a *Nauplius* (q.v.) like that of other lower crustaceans. It has the usual three pairs of legs, an unpaired eye, and a delicate shield on its back. It molts several times, grows bigger, and develops a firmer shield, a longer spined tail, and stronger limbs. The second short chapter in its history is known as the Cypris stage, in which the larva acquires two side eyes, six pairs of swimming legs, a bivalve shell, and other organs. At the end of this stage, during which no food is

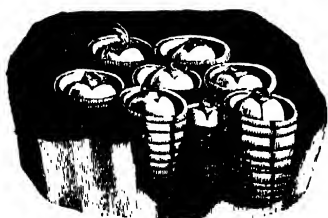


Pedicel larva of acorn shell; *b*, external shell of adult; *c*, vertical section of adult. (From Darwin's Monograph.)

eaten, the larva becomes fixed by its feelers and the glue of the cement-gland. A new regime begins; some organs such as the side eyes, the antennae, the bivalve shell, the tail, and the swimming legs, are lost; while new structures appear, such as the curled waving legs, and the incipient external shell. During these changes there is quiescence and fasting, and the stage was described by Darwin as the 'pupa.' The skin of the pupa molts off, certain changes of position take place, and the permanent structure and activities of the adult are gradually assumed. The external firm shell of the rapidly growing adult cannot, of course, be molted, but at frequent periods the whole lining of the shell and the skin of the legs is shed (see SKIN-CASTING). These cast coats are exceedingly common, especially during the spring months. Darwin quotes an observation of Mr C. W. Peach, who notes their extraordinary abundance, and says, 'he could easily have filled several quart measures with them.'

The acorn-shells feed on small marine animals. They are attached not only to rocks, but to floating objects and to other animals. Numerous species are known, of which *B. improbus* inhabits brackish water. The sessile *Balanidae* differ from the stalked Barnacles (q.v.) or *Lepadidae* only in detail; in both families the waving legs are borne by the thorax, and they were therefore classed by Darwin, in his famous memoir of the Cirripedia, in the sub-order Thoracica. Some of the larger

species of *balanus* were esteemed by the Romans, and are still eaten by Chinese and others. *B. psittacus* sometimes measures 4 inches in



Acorn-shells in the skin of a whale.
(From Bronn's *Thier-Reich*.)

a meter, and *B. tintinnabulum* is also large. See Darwin's *Monograph of Cirripedia* (2 vols 1851-54); Huxley's *Invertebrata*.

Acorns. See CALAMUS ROOT.

Acosta, GABRIEL, or URIEL D', a Portuguese of noble Jewish birth, was born at Oporto about 1594. Brought up a Catholic, he early adopted the faith of his fathers, and fled to Amsterdam, only to find there how little modern Judaism accorded with the Mosaic Law. For his *Examination of Pharisaic Traditions* (1624), a charge of atheism was brought against him by the Jews before a Christian magistracy; and having lost all his property, twice suffered excommunication, and submitted to humiliating penance, he at last shot himself (1647). His autobiography was published in Latin and German (Leip. 1847).

Acotyledonous Plants—i.e. without seed-leaves or cotyledons—a term first emphasised by A. L. de Jussieu, who included all the plants now known as cryptogams under the title *Acotyledones*. They include Algae, Fungi, Liverworts, Mosses, Ferns, Horsetails, Lycopods (q.v.), and are contrasted with the conifers, monocotyledons, and dicotyledons, which produce seeds containing an embryo with rudimentary root, stem, and leaves. The term is no longer in use. See CRYPTOGAMS.

Acoustics ('Gr. *akouo*, 'I hear') is sometimes used for the science of sound in general, which in this work is treated at SOUND, but more commonly for the special practical branch of that science which deals with the construction of public halls, churches, &c. so as to secure the accurate hearing of speech or music. It must be confessed that, in this practical sense, the science is still in its infancy. It is very easy, in general, to point out the causes of acoustic defects in a building *once it has been erected and tried*: it is quite another matter to predict from the plans what are likely to be its defects; except, of course, when some flagrant violation of simple principles has been perpetrated. One reason for this is obviously the want of data on which to reason, due to the enormous cost which would be involved in a thorough experimental treatment of the subject. The consequence is that when by chance one successful attempt has been made, architects prefer to copy it rather than to attempt some new form, which might probably entail complete failure.

The improvement of the acoustic properties of a building must be determined by the ascertained defects, so that no general rule can be laid down. One great point is the prevention of echoes, unless these reach the ear almost at the same moment with the original sound. This can be effected in many cases by lowering the ceiling so as to expedite the echo; also by hanging carpets or heavy tapestry on the walls, and especially in the corners of the building. These have the effect of

abolishing it. Idiotic attempts are constantly being made nowadays to secure the same results by stretching wires about in various directions. Such devices betray absolute ignorance of the mode of propagation of sound.

Acquaviva, a town of Bari, South Italy, in a healthy situation at the foot of the Apennines, on the Bari and Taranto Railway, 28 miles SSE. of the former town. Pop. (1881) 7986.

Acqui (Lat. *Aque Statiellæ*), a town of Northern Italy, 21 miles SSW. of Alessandria by rail. It derives its name from its hot sulphur springs, which were known to the Romans. The town contains an old castle, a Gothic cathedral (12th century), and remains of a Roman aqueduct. Pop. (1881) 7411.

Acquiescence is the name applied to an important principle of equity in the law of both England and Scotland. It means either (1) the failure for a length of time to take an objection, of which the party is aware, to an invalid or challengeable agreement, or a set of accounts; or (2) the failure to object to any important proceeding by another person, involving expense and difficulty of restoration, in such circumstances that it is fair to conclude that the person failing to object has tacitly agreed to his property or other rights being dealt with. Acquiescence closely resembles the Scottish doctrine of *rei interventus* in the law of contracts, and also to some extent the doctrine of estoppel by conduct in the law of England.

Aceraspeda (Gr., 'without a border'), a term applied to Jelly-fishes (q.v.) without an inward fringe or *velum* round the edge of the disc. *Rhizostomat*, *Pelagia*, *Aurelia* are common representatives.

Acre. The word (from A.S. *æcer*) is identical with Gothic *akraz*, Ger. *acker* ('a cultivated field'), Lat. *ager*, Gr. *agros*, Sansk. *ajras*. Most nations have, or had, some measure nearly corresponding; originally, perhaps, the quantity which one plough could plough in a day.

The English statute acre consists of 4840 sq. yards. The chain with which land is measured is 22 yards long, and a square chain will contain 22×22 , or 484 yards; so that 10 sq. chains make an acre. The acre is divided into 4 roods, a rood into 40 perches, and a perch contains 30½ sq. yards. The old Scotch acre is larger than the English, and the Irish than the Scotch. 23 Scotch acres = 29 imperial acres; 30½ Irish acres = 49 imperial acres. The hectare of the French metric system has on the Continent superseded almost all the ancient local measures corresponding to the acre—such as the Prussian *morgen*.

English acre.....	1.00
Irish ".....	1.27
Irish ".....	1.62
France (Hectare = 100 ares).....	2.47
France (Arpent (old system).....	0.99
Prussia (Little Morgen).....	0.63
Prussia (Great Morgen).....	1.40
United States, English acre.....	1.00
Roman Jugerum (ancient).....	0.60
Greek Plethron (ancient).....	0.23

Acre, ST JEAN D', or ACÇA, the Biblical *Accho*, is a seaport on the coast of Syria, not far from the base of Mount Carmel, and contains about 10,000 inhabitants. It is 80 miles NNW. of Jerusalem, and 27 S. of Tyre. The harbour is partly choked with sand, yet is one of the best on this coast. In 1887 a railway was projected from Acre to Damascus; and omnibuses were running regularly from Haifa to Acre. It was named Ptolemais from King Ptolemy Soter of Egypt. Taken by the Crusaders in 1110, it was recovered in 1187 by the Sultan Saladin; but retaken in 1191 by Richard I. of England and Philip at a cost of 100,000 men.

The town was now given to the Knights of the Order of St John, who kept it by constant fighting for a hundred years. In 1517 it was captured by the Turks; in 1799 it was besieged by the French for sixty-one days, but was successfully defended by the garrison, aided by a body of English sailors and marines under Sir Sidney Smith. In 1832 it was stormed by Ibrahim Pacha, son of the viceroy of Egypt, and continued in his possession till it was bombarded and taken, in 1840, by a combined English, Austrian, and Turkish fleet.

Acri, a town of South Italy, 13 miles NE. of Cosenza. Pop. (1881) 3944.

Acrobat, a word derived from the Greek, and nearly synonymous with rope-dancer. It literally signifies one who walks on tiptoe (*akron*, 'extremity,' and *batino*, 'I go'); and is employed to designate those who perform difficult feats, vaulting, sliding, tumbling, and dancing on a slack or tight rope, stretched either horizontally or obliquely. These feats require great skill, suppleness, and steadiness. For a long time, acrobats were contented to divert and astonish only children or the most ignorant of the populace; but the extraordinary skill of some recent performers has given this perilous art a great celebrity. Within the 19th century, Faisio, Madame Saqui, and Signor Diavolo have excited admiration by their marvellous agility; Blondin was even more widely known. The acrobats of antiquity appear to have closely resembled those of our own day.

Acrocerania, a promontory in the NW. of Epirus, jutting out into the Ionian Sea, the termination of the Montes Ceraunii. This range derived its name from the frequent thunder-storms which occurred among its peaks (Gr. *keranos*, 'thunder'). The coast of the Acrocerania was dangerous to ships, hence Horace in a well-known ode speaks of its 'ill-famed rocks.' Its mountains are alluded to by Shelley in his poem *Arcturion*.

Acrogenus (Gr., 'summit-growers'), a term applied to the higher cryptogamic plants in which root, stem, and leaf are usually distinctly developed—e.g. ferns, club-mosses, horsetails, &c. The name refers to the structure and growth of the stem in which the vascular bundles when present are 'simultaneous' (see STEM) in development, and growth occurs only at the apex, while increase in thickness is effected by the coherence of leaf-bases or the formation of roots. Of this 'acrogenous' growth, tree-ferns are the best examples. The term has, however, fallen into disuse, along with the terms Exogen and Endogen (q.v.), on account of the erroneous views of dicotyledonous and monocotyledonous stem-growth which these latter respectively imply.

Acrolein, C_2H_3COH , is a colourless, limpid, strongly refracting liquid, lighter than water, and having its boiling-point at about $126^\circ F.$ ($52.4^\circ C.$). It constitutes the acrid principle produced by the destructive distillation of fatty bodies, and is in part due to the decomposition of glycerine. It is best prepared by distilling a mixture of glycerine and anhydrous phosphoric acid, the object of the latter being to effect the removal of the element of four atoms of water from the glycerine, $C_3H_8O_3$, which contains the elements of acrolein, C_2H_3COH , + those of two molecules of water, $2H_2O$. In its state of vapour, it is extremely irritating to the eyes, nostrils, and respiratory organs—a property to which it owes its name. The pungent smell given off by the smouldering wick of a candle just blown out is due to the presence of acrolein. When mixed with a solution of potash or soda, the irritating odour disappears, and is replaced by an odour of cinnamon, while a brown resinous substance is formed; and certain oxidising agents,

as oxide of silver, convert it into *acrylic acid*, C_2H_3COOH .

Acroliths (Gr. *akron*, 'extremity,' and *lithos*, 'a stone'), the name given to the oldest works of Greek plastic art, in which wood-carving is seen in transition into marble statuary. The trunk of the figure is still, in the old style, of wood, covered with gilding or with actual cloth drapery; but the extremities—head, arms, feet—which are meant to appear naked from below the drapery, are of stone. Compare the *chryselephantine* statues.

Acropolis, 'the high-town,' was, in many of the important cities of Greece and Asia Minor, the name of the citadel. It usually occupied the summit of a rock or hill, and was fortified, commanding the city and its environs. It contained some of the most important public buildings, especially temples, besides affording a last refuge in case of a hostile attack. The acropolis, like the castle of the middle ages, formed the centre or nucleus around which the town gradually grew. Notable amongst these old Greek strongholds were the Acropolis of Argos; that of Messene; that of Thebes, called Cadmea; that of Corinth, known as Acro-Corinthus; but especially that of Athens, which was styled pre-eminently the Acropolis, and contained the Parthenon, the Erechtheum, and other famous buildings. See ATHENS.

Acrostic (Gr., made up of *akros*, 'pointed, first,' and *stichos*, 'a row'), a term for a number of verses the first letters of which follow some predetermined order, usually forming a word—most commonly a name, or a phrase or sentence. Sometimes the final letters spell words as well as the initial, and the peculiarity will even run down the middle of the poem like a seam. Sir John Davies composed twenty-six *Hymns to Astrea* (Queen Elizabeth), in every one of which the initial letters of the lines form the words ELISABETHA REGINA. The following is one of the twenty-six:

E very night from ev'n to morn,
L ove's chamber and the thorn
I s now so sweet a singer;
S o sweet, as for her song I scorn
A pello's voice and finger.

B ut, nightingale, sith you delight
E ver to watch the starry night,
T ell all the stars of heaven,
H eaven never had a star so bright
A s now to earth is given.

R oyal Astrea makes our day
E ternal with her beams, nor may
G ross darkness overcome her;
I now perceive why some do write
N o country hath so short a night
A s England hath in summer.

One of the most ancient and remarkable acrostics is the phrase in Greek, 'Jesus Christ, the Son of God, the Saviour,' the initial letters of which form the word *ichthys*, 'a fish,' to which a mystical meaning was attached. In the acrostic poetry of the Hebrews, the initial letters of the lines or of the stanzas were made to run over the letters of the alphabet in their order. Twelve of the psalms of the Old Testament are written on this plan. The 119th Psalm is the most remarkable. It is composed of twenty-two divisions or stanzas (corresponding to the twenty-two letters of the Hebrew alphabet), each stanza consisting of eight couplets; and the first line of each couplet in the first stanza beginning, in the original Hebrew, with the letter *aleph*, in the second stanza with *beth*, &c. The divisions of the psalm are named each after the letter that begins the couplets, and these names have been retained in the English translation. With a view to aid the memory, it was customary at one time to compose verses on sacred subjects

after the fashion of those Hebrew acrostics, the successive verses or lines beginning with the letters of the alphabet in their order. Such pieces were called *Abecedarian Hymns*.

Acroterion (Gr., 'the summit'), a term for a statue or other ornament placed on the apex or at one of the lower angles of a pediment. Some understand by acroterion, the pedestal on which such ornament stands.

Act has various technical meanings, legal and other; frequently a document in writing, as when a person executing a legal instrument, declares it to be his *act and deed*. Or it may be the record of an act or proceeding of a public nature, as an Act of Parliament (q.v.). This use of the word is derived from the Romans, who employed *Acta* to signify the records of public official transactions.

ACT OF BANKRUPTCY (a technical term in English Bankruptcy Law, defined by the Bankruptcy Act, 1883), any act which subjects a person to be proceeded against as a bankrupt. An insane person cannot commit an act of bankruptcy. See **BANKRUPTCY**.

ACT OF GOD is a legal expression, and signifies any occurrence not caused by human negligence or intervention; such as storms, lightning, tempests, the consequences of which no party under any circumstances (independently of special contract) is bound to make good to another. The chief applications of the term are in Insurance, where Act of God is an exception to the liability of the insurer; and in the law of contract, where Act of God often excuses from performance.

In the United States, an act signifies something done for which the person doing is responsible; something done by an individual in his private capacity, or as an officer; or by a body of persons, as an association, corporation, legislature, or court. It includes not only physical acts, but also decrees, orders, resolutions, and laws. An act indicates intention. In criminal matters, an act does not make the actor criminal unless the intention was criminal. An act is also an instrument in writing to verify facts. A public act is one that has public authority, made public by authority, or attested by a public seal; one pertaining to the whole community, while a private act operates upon particular persons and private concerns.

Act, in the Drama, is a distinct section of a play, in which a definite and coherent part of the plot is represented. It is generally subdivided into smaller portions called *scenes*, and its conclusion is properly marked by a fall of the act-drop or curtain. As every dramatic plot naturally divides itself into three parts—the exposition, the development, and the conclusion or catastrophe—a division into three acts would seem most natural, and has accordingly been adopted in modern comedies. But it has been found inconvenient to inclose extended plots in such limits, and since the earliest days of tragedy, *five* acts have generally been considered necessary for its satisfactory development.

Act of Congress. See **CONGRESS**.

Act of Parliament. See **PARLIAMENT**.—For the Acts of Settlement, of Toleration, of Uniformity, and the Test Acts, see **SETTLEMENT**, **TOLERATION**, **UNIFORMITY**, and **TEST ACTS** respectively.

Acts of Sederunt, ordinances of the Court of Session or supreme civil court in Scotland, made originally under authority given by King James V. in 1532, and ratified by the Scots Act, 1540, chap. 93, whereby the judges are empowered to make such rules or ordinances as may be necessary for the regulation of legal procedure and the expediting of

justice. In accordance with this authority, the court have passed a great number of Acts prescribing the forms of process in both superior and inferior courts, which, under certain penalties, must be complied with by litigants, although the court may, in extreme cases, dispense from the letter of the Act. The leading rules and forms of process are prescribed by statute, but many recent statutes give power to the court to make Acts of Sederunt which are generally laid before parliament. Thus, the rules in election petitions, the fees of law-agents and burgh registrars, the examination of law-agents, have been provided for in this way. The Report of the Scottish Judges to the House of Lords in 1810 shows that this power of regulation was formerly extended to legislation by the judges, but the only Act of Sederunt of this kind now in force, and which has not been ratified by parliament, is that of 1756, relating to removings of tenants. No legislative power is now claimed by the Scottish judges. There are many collections of Acts of Sederunt by Tait, Alexander, McLaren, Adam, and others.

Acts of the Apostles, the fifth book of the New Testament, the authorship of which is ascribed by tradition to the Evangelist Luke. It is in form substantially a continuation of the Gospel of St Luke. Beginning with the ascension of Christ, it gives an account of the spread of the Christian Church; the first part of the book deals largely with the work of St Peter, and the planting of the church in Jerusalem and Judaea. The second part (chap. xiii. to the end) may be said to be wholly occupied with the history of Paul and his companions, and the extension of the church amongst the Gentile nations. In the second part, the narrative is frequently given in the first person plural. It has been pointed out that there are traces of the use of earlier documents in the Acts. The difficulty of reconciling some of the statements in the Acts with Paul's epistles, notably the account of the council of Jerusalem in Acts xv. as compared with Gal. ii. 9, taken along with the parallelism between Paul and Peter apparently carried out in the Acts, plays an important part in the 'tendency theory' of the new Tübingen school. Baur (q.v.) and his disciples held that the early Christian Church consisted of two widely divergent and warring sects, the Jewish-Christian or Petrine, and the more liberal Pauline party; that some of the books of the New Testament, and very especially the Acts, were written not in a purely historical spirit, but with the view of minimising the differences that had existed between the two hostile sections of the church, at a time when the Pauline spirit had been on the whole triumphant. The later followers of Baur are less extreme than the earlier ones (as Zeller) in their differences from the orthodox view, in which the historical accuracy of the book and the harmony of the teaching of the apostles is maintained. See De Wette's Introduction, Hausrath's *Neutestamentliche Zeitgeschichte*, Davidson's *Introduction to the New Testament*, and the more conservative commentaries of Meyer and others.

Actra. See **BANEBERRY**.

Actra'on, in Greek Mythology, a famous hunter, a grandson of Cadmus. He was trained as a hunter by the centaur Chiron. Having surprised Diana bathing in a fountain, he was changed by the offended goddess into a stag, in which form he was torn to pieces by his own dogs on Mount Cithæron. According to Euripides, Diana was jealous because Actæon had boasted that he excelled her in hunting.

Acta Sanctorum or **Mar'tyrum** (Acts of Saints or Martyrs), the collective title given to

several old writings, respecting saints and martyrs, in the Greek and Roman Catholic churches, but now applied especially to one great collection already extending to more than sixty volumes. Begun by the Jesuits in the 17th century, it was continued by a succession of editors, usually called the Bollandists (q.v.). For notices of other and similar collections, see SAINTS, and MARTYR.

Actinia. See ANEMONE.

Actinism (Gr. *aktis*, 'a ray of sunlight') is a term whose signification has varied considerably. It seems to have been invented by Sir J. Herschel (about 1824), and with him it was used to express the heating power of sunlight. His Actinometer was employed for the same purposes as the Pyrheliometer (q.v.). Later, the term was applied to the property which certain rays of light (alone) appeared to possess—of decomposing chemical compounds (see SPECTRUM and PHOTOGRAPHY). Recent discovery has proved that there is no special class of actinic rays, it being found possible to utilise any of them photographically by proper physical and chemical processes. The general treatment of the subject will be found under Radiation of Heat; and the term Actinism, unless a perfectly novel sense be invented or discovered for it, is now superfluous.

Actinomyco'sis (Gr. *aktis*, 'a ray,' and *mykēs*, 'a mushroom'), the name now given to a disease long known to occur in cattle, but confounded with tubercle or sarcoma. In 1877 Bollinger of Munich showed that little yellow grains are always present, consisting of a minute fungus, with its mycelium arranged in a radiate manner. To this fungus he gave the name Actinomyces; and further observation has confirmed his view that it is the cause of the disease. Actinomycosis is most common in cattle, occurs also in pigs, and (rarely) in man. It consists of tumours, sometimes of large size, formed of inflammatory material deposited round numerous grains of the fungus. They frequently suppurate and break down. In cattle they occur usually in the jaws, mouth, and stomach; in man in the neck, lungs, and adjacent parts.

Actinozo'a (Gr. *aktis*, 'a ray,' and *zōon*, 'an animal'), one of the three classes of Coelenterates, including sea-anemones, dead-men's fingers, corals, &c. Like all Coelenterates, they possess a central mouth and digestive cavity, and are provided with Stinging Cells (q.v.); but they are distinguished from the other two classes (Hydrozoa and Ctenophora) by the possession of a turned-in mouth-tube, forming a stomatopore region distinct from the body-cavity, and by the presence of a definite number of radial partitions extending from the inner tube to the body-wall. They are provided with tentacles round the mouth, and live either isolated or in colonies. The generative products are always formed on the cross partitions or mesenteries above referred to. The Actinozoa include two orders—Acyonaria or Octacoralia, with eight tentacles; and Zoothalia or Hexacoralia, with tentacles in sixes. Of the former Aequorea, or dead-men's fingers, is a common type; and the sea-anemone is a familiar representative of the latter, to which the vast majority of corals also belong. See ALCYONUM, ANEMONE, CORAL.

Action, in its large sense, means a judicial proceeding before a competent tribunal for the attainment of justice. In this sense it is applied to procedure, whether *criminal* or *civil*. In its more limited application it is used to signify proceedings in the *civil* courts, where it means the form prescribed by law for the enforcement of a right. In the law of England, the term action used to be applied to proceedings in the courts of *common law*,

as distinguished from those of *equity*, where the word *suit* was used. Although the word *suit* is now abolished, certain actions (such as for debt, damages, and recovery of property) are competent only in the Common Law Division of the High Court, while others (such as for specific performance of contracts, partnership accounts, execution of trusts, administration of the estates of deceased persons) are competent only in the Chancery Division. In Scotland, the formal distinction between law and equity never obtained, so that all actions are competent in the Court of Session, although certain applications (such as those for custody of children, *interim* appointment of public officers, regulation of charitable trusts, determination of matters omitted in deeds and statutes) are competent only in the Inner House. The leading actions in the law of Scotland are declarators, reductions, petitory and possessory actions; these, however, are generally found in certain combinations. Declarator is for a decree defining and declaring the right of the pursuer, and is, of course, of no practical value, unless the action is opposed by some one alleging a competing right. Reduction is to set aside a formal document as granted in error or obtained by fraud. Petitory action is for money, whether debt or damages; while possessory is to maintain the *status quo*. Actions in Scotland were never confined to the same rigid *formule* in original writ and subsequent pleading as in England. Now, however, there is no very substantial difference between the course of an action in England and in Scotland. The first step is to bring the defending party into court by service of a summons; the next to ascertain by a record or adjusted pleadings what is the question at issue; the next to ascertain by argument, evidence, or both, which party is in the right; a judgment on a question of law being generally subject to appeal, while the verdict of a jury on a matter of fact is generally final. In England, owing to recent reforms, the defending party has a much larger power of bringing forward a counter claim than in Scotland, and can even obtain decree in his favour if the counter claim exceeds the original claim. Every action includes many incidental matters, such as motions to recover documents, to sist new parties, to amend, &c. The expenses of an action are generally ordered to be paid by the losing party, subject, however, to audit or taxation by an officer of court. See COMMON LAW (COURTS OF), and EQUITY.

Actium, a promontory on the west coast of Greece, at the entrance of the Ambracian Gulf, memorable for the naval victory gained near it by Octavian (afterwards the Emperor Augustus), over Mark Antony and Cleopatra, which decided the fate of Rome and of the world, 2d September 31 B.C. The two armies were encamped on the opposite shores of the gulf. Octavian had 80,000 infantry, 12,000 cavalry, and 250 ships of war; Antony, 100,000 infantry, 12,000 cavalry, and 500 ships. Antony's ships were large, and well provided with engines for throwing missiles, but clumsy in their movements; Octavian's were smaller and more agile. It was the advice of Cleopatra that decided Antony to rest the issue on a sea-fight. The battle continued for some hours undecided; at last, Agrippa, who commanded Octavian's fleet, succeeded, by a skillful manœuvre, in compelling Antony to extend his line of battle, the compactness of which had hitherto resisted all attempts of the enemy to break through. Cleopatra, who was stationed behind Antony's line, in terror took to flight with her sixty ships, and Antony at once flung away the empire of the world, and recklessly followed her with a few of his ships. The deserted fleet continued to resist bravely for some time, but was finally vanquished;

the land-army, after waiting in vain seven days for Antony's return, surrendered to Octavian.

Acton, SIR JOHN FRANCIS EDWARD, minister of Ferdinand IV. of Naples, was the son of an English physician, and was born at Besançon in 1737. After acquiring distinction in the naval service of Tuscany, he became successively admiral and generalissimo in that of Naples, and soon managed the entire administration. His measures, able but arbitrary, ultimately caused a reaction against the royal family of Naples, and in favour of the French party. Acton fell from power in 1806, and died August 12, 1811, at Palermo.

Acton, LORD. John Acton, grandson of the preceding, was born at Naples in 1834, and succeeded his father, a Shropshire baronet, in 1838.

He was educated at Oscott under Cardinal Wiseman, and at Munich by Dr Dollinger, the 'Old Catholic' theologian, whose views he zealously espoused, distinguishing himself in Rome, in 1870, by his hostility to the dogma of papal infallibility. He sat for Carlow (1859-65), and was raised to the peerage by Mr Gladstone in 1869, under the title of Baron Acton of Aldenham. The leader of the Liberal Catholics in England, he was editor of the *Home and Foreign Review* (1862-64), and afterwards of the *Weekly Chronicle* and *North British Review*; whilst, by his contributions to the controversy on the Vatican decrees (1874), by his articles on Wolsey (1877), on German Schools of History (1886), &c. he has earned a wide reputation for learning. He was made a D.C.L. of Oxford in 1887.

Acton Burnell, a Shropshire parish, 8 miles SSE. of Shrewsbury. At the ruined castle here was held, in 1283, a parliament of Edward I., which carried the 'Statute of Merchants' for the recovery of debts. See DEBTOR.

Actuary. The *Actuarii*, in ancient Rome, were clerks who recorded the *Acta* of the senate and other public bodies. The term might therefore, so far as its etymology is concerned, be applied to men of business in general. But in the constantly increasing tendency to subdivide labour and specialise functions, there has arisen, in recent times, a distinct branch of business, embracing all monetary questions that involve a consideration of the separate or combined effects of Interest and Probability, especially as connected with the duration of human life: and it is to one who devotes himself to this department of business that the name of actuary has been specially assigned. The investigations and calculations of the actuary supply the principles of operation for the numerous institutions now engaged in the transaction of life-assurance, annuity, and reversionary business. His functions might be briefly defined as *the application of the doctrine of probabilities to the affairs of life*. There are two Societies of Actuaries in this country: 'The Institute of Actuaries of Great Britain and Ireland,' founded in 1848, and incorporated by royal charter in 1884; and the 'Faculty of Actuaries in Scotland,' established 1856, and incorporated in 1868. The Fellows of the former society are distinguished by the initials 'F.I.A.' and those of the latter by 'F.F.A.' In the United States, no societies of actuaries have as yet been established.

Aculeus, in Botany. See PRICKLE.

Acupressure (Lat., 'press.' with a needle'), a mode of arresting hæmorrhage from cut arteries, introduced by the late Sir James Y. Simpson. It consists in the insertion of a needle through the tissues on both sides of the bleeding vessel, in such a manner that the elasticity of the tissues, aided sometimes by a wire firmly looped round the projecting ends of the needle, presses the

artery against the needle and closes its tube. It is now rarely used; and only under special circumstances. Acupressure has also occasionally been used in the treatment of Aneurism (q.v.).

Acupuncture (Lat., 'pricking with a needle') is a very ancient remedy, and one practised extensively in the East, for the cure of headaches, lethargies, &c. In Europe it is principally employed to relieve neuralgic pains, and those of chronic rheumatism. Steel needles are made use of, about three inches long, and set in handles. The surgeon, by a rotatory movement, passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. Their insertion is accompanied by no pain, except the first prick—a fact the quacks of the 16th century did not fail to take advantage of. According to Jerome Cardan, they travelled from place to place practising acupuncture, and before inserting the needle, they rubbed it with a peculiar kind of magnet, either believing or pretending that this made the operation painless. The relief to pain afforded by this simple operation is sometimes astonishing, and the wounds are so minute as to be perfectly harmless. Needles protected except at their points by insulating material are sometimes used as conductors of the galvanic current to deep-seated parts. For the use of hollow needles in the administration of medicines, see HYPODERMIC INJECTION. See also NEURALGIA.

Ada, a town of Northern Hungary, on the river Theiss, an important station for steamers. Pop. (1881) 9693.

Adagio (It.), a slow or very slow movement or measure of time in Music. In the more extended compositions of orchestral or chamber music, the second or third *movement* is generally marked *adagio*, and serves as a contrast to the rapid and energetic movement of the preceding and following parts of the sonata or symphony. The distinctive feature of the adagio being its power of expression, it affords the most direct means to the composer of manifesting his individuality of feeling. The finest specimens of the adagio are found in the works of the old masters, above all in Beethoven. In recent works, our composers have generally succeeded better in their rapid movements than in the adagio (see SYMPHONY).

Adal is the name of the flat and barren country lying between the Abyssinian plateaux and the Red Sea, from Massowa to the Bay of Tajurra, its greatest width being 300 miles. The native tribes are of the same stock as the Danakil, and are Mohammedans.

Adalbert, Sr. the apostle of the Prussians, was a native of Prague, and was chosen its bishop in 982. His austerity irritated the lawless and but recently converted Bohemians, and he was obliged to flee from his diocese. Soon after his return, he left it anew to carry the gospel to the Hungarians. He afterwards preached without much success to the heathen Poles and Prussians, and was murdered by the latter, 23d April 997. His body was buried in the cathedral at Gnesen, and afterwards carried to Prague; and here, in 1880, his bones were discovered in a vault and re-interred in the cathedral.

Adalbert, a great German ecclesiastic, born of a noble family about 1000, was appointed Archbishop of Bremen and Hamburg in 1045, and papal legate to the north in 1053. He soon extended his spiritual sway over Scandinavia, and carried Christianity to the Wends. In 1063 he became tutor of the young Henry IV., and soon, spite of the opposition of the nobles, ruled over

the whole kingdom. His ambitious mind now conceived the design of founding a great northern patriarchy, which should vie with the Roman curia itself; but he died too soon for his vast design, at Goslar, March 16, 1072.

Adalia, anciently *Attalia*, a small seaport on the south coast of Asia Minor, at the head of the Gulf of Adalia. Pop. 5000, mostly Turks.

Adam and Eve, the names of the first pair of human beings in the account of the creation given in the book of Genesis. 'Adam' is strictly a generic name, applicable to both man and woman, as used in Genesis, chapter i.; but it came to be a proper name used with the article, as in chapters ii., iii., and iv. The origin of the name is uncertain, but is usually connected with the Hebrew root *Adam*, 'to be red.' It is often derived from *Adamah*, 'the ground,' but this is taking the simpler from the more developed form. The Assyrian equivalent is *Adamu*, 'man,' used only in a general sense, not as a proper name. This is connected by Sir Henry Rawlinson and Professor Sayce with *Adamatu*, 'red skins,' the Assyrian word by which the dark-skinned Accadians of primitive Babylonia are designated in the bilingual tablets. Eve is the Hebrew *Hawwah*, which name, according to Gen. iii. 20, Adam gave her as the 'mother of all living.' Literally the word means 'life.'

The early part of Genesis contains two somewhat different accounts of the creation of Adam. In the earlier account (i. 26-30), the creation of man and woman is given after the creation of the animals; in the second account (chapter ii.), the creation of Adam is mentioned before that of the animals, and the forming of Eve afterwards. The first narrator is commonly called the Elohist, from his use of the name *Elohim* for 'God'; the second, the Jehovist, from his using the name *Jehovah Elohim*. The Elohist narrator simply states that God created man in his own image. Man is created at the close of the six days' work as the lord of the whole lower world, for whom all things are made. The Jehovist narrator gives a detailed account of Paradise, the original sin of Adam and Eve, their subjection to the curse, and expulsion from Eden (q.v.). It is, in Ewald's phrase, the 'history proper of the creation of man.' The first condition of Adam and Eve is one of innocent simplicity. They are placed in Eden, where they are allowed to taste freely of the fruit of every tree save one. Temptation comes from without, through the serpent's persuading Eve that the divine prohibition is really intended to keep human beings from becoming as wise as God. Eve yields to the temptation, and leads Adam also into her sin; and thus the moral consciousness of man awoke, and spiritual death passed upon mankind. Adam and Eve are then driven out of Paradise, and prevented by the cherubim and a flaming sword which turned every way, from returning 'to take also of the tree of life, and eat, and live for ever.' Adam lives 930 years; has three sons, Cain, Abel, and Seth, then sons and daughters.

Such is the form of the story which has usually been interpreted by orthodox Jews and Christians as a narrative of literal history, notwithstanding many difficulties about the anthropomorphic details and the admitted uncertainty of the point where the literal ends and the figurative begins. Many of the later Jews explained the story as an allegory. Philo, the foremost writer of the Alexandrian school, explains Eve as the sensuous part, Adam as the rational part, of human nature. The serpent attacks the sensuous element, which yields to the temptation of pleasure, and next enslaves the

reason. Clement and Origen adapted this interpretation somewhat awkwardly to Christian theology. Augustine explained the story as history, but admitted a spiritual meaning superinduced upon the literal; and his explanation was adopted by the Reformers, and indeed generally by the orthodox within the Romish and the various Protestant churches alike. More modern critics have sought to separate the kernel of history from the poetical accretions, and attribute the real value of the story, not to its form, but to the underlying thoughts. Martensen describes it as a combination of history and sacred symbolism, 'a figurative presentation of an actual event.' The narrative may be regarded as embodying the philosophy of the Hebrew mind applied to the everlasting problem of the origin of sin and suffering; a question the solution of which is scarcely nearer us now than it was to the primitive Hebrews. It is not the form of the story which is material here, but the substance and the meaning; and the elemental truth of the fall of man by misuse of his free-will remains a religious fact, apart altogether from the historical form in which the fact is stated. In the Pauline theology Adam stands as the covenant head or federal representative of the whole human race in contradistinction to Christ, 'the second man,' 'the last Adam.' See FALL.

Egyptian, Babylonian, and Persian accounts.—The fundamental ideas of pantheism and emanation, which formed the basis of the great religions of the ancient world, were perfectly consistent with a vague theory of the origin of man, which explained him as having issued somehow from the very substance of divinity itself by a kind of spontaneous generation, a development of the chain of emanations, rather than as the result of a free act of a creative will. Such is the account in the *Sanchoniathon*, a fragment of a Phœnician cosmogony that has reached us in a Greek version. Egyptian accounts explain that the fertile slime left by the Nile, under the vivifying influence of the heat of the sun's rays, sprouted into the bodies of men; or as expressed in mythological form, men spring from the eye of the sun-god. This emanation produced the material body, but a later demiurgic process moulded the form to beauty and communicated to it a soul. Various nations were thus formed by different goddesses: the Egyptians—the highest race in the world—were moulded by the supreme demiurge, Khnoum. One very detailed Babylonian account of the creation is preserved in the Greek of Berossus (q.v.). According to it there was a time when there was nothing but darkness and an abyss of waters, inhabited by a monstrous brood of composite creatures, over which presided a woman named Omeroia ('the sea,' *Tiamat*). Bel cut this woman asunder, making of her lower half the earth, and of her upper half the heavens, while he destroyed all the creatures within her. He next cut off his own head, on which the other gods kneaded the blood as it gushed out with earth, and from it formed men. Hence it is that they are rational and partake of divine knowledge. Next he formed, in the same way, the animals, then the stars, the sun, the moon, and the five planets. Here, leaving out the polytheistic element, the facts follow the same order as in the narrative of the Jehovist author of Genesis.

Another account, deciphered from the cuneiform inscriptions, has a striking resemblance to the story in the first chapter of Genesis, but it is questioned by Sayce whether this account was translated into Assyrian from an older Accadian document, or in its present form is older than the 7th century B.C. Unfortunately only portions of it exist. It would appear that in these inscriptions the events of each of the days' work were recorded on a special tablet,

and that the numbers of the tablets generally followed the same order as the days of creation in Genesis. Thus, the first, which gives an account of Chaos and the generation of the gods, corresponds closely with the first two verses of the first chapter of Genesis, even to the same word being used in both narratives as the name of the *Chaos*. The fifth tablet, giving the creation of the heavenly bodies, is the most recognisable portion, and is closely parallel to the fourth day of creation in Genesis; while the seventh corresponds with the sixth day. Another tablet refers to the creation of man, ascribing it to Hea, as in all the references in other inscriptions. George Smith interpreted one of the inscriptions which he discovered as a Babylonian version of the story of the fall, but Delitzsch pointed out that this reading was erroneous, and Oppert

afterwards proved that it was really a hymn to the Creator Hea. No legend of the fall has as yet been found, but the serpent frequently occurs; and from his epithets is evidently an embodiment of moral evil. An archaic Babylonian gem represents a tree, on either side of which are seated a man and woman, with a serpent behind the latter, and their hands are stretched out towards the fruit that hangs on the tree; but Schrader warns us that here there is not the slightest indicated reference to what constitutes the specific feature of that narrative—the presentation of the fruit by the woman to the man. The palm may be recognised as the prototype of the ‘sacred tree’ as represented on the Assyrio-Babylonian monuments. Somewhat similar mystic trees were the Haoma of the Iranians, and the Soma in India.

The religion of Zoroaster is the only one of the ancient religions other than the Jewish which ascribes the creation to the free-will of a personal god, distinct from primordial matter. Ahuramazda, the good and great god, creates the universe and man in six successive periods of a year. The first man is Gayōmaretan. In the Pehlevi *Bundehesh*, the cosmogony goes further. Here both a man type and a bull type are formed, who live for 3000 years on the earth, until the latter is destroyed by Angromainyus, representing the evil principle. Next the man also falls, but from his body after forty years springs a stalk, from which blooms a creature of double body, both male and female, which Ahuramazda divides into two, and so forms Maschya and Maschyana, the couple from whom descend the whole human family.

It was a common opinion that man was created both male and female in one body, and that the two sexes were separated to form man and woman. This is taught by many of the Rabbis, and is suggested by Aristophanes in the *Symposium* of Plato, to explain the passion of love, which is merely a craving of the incomplete and imperfect for its original completeness and perfection. Lenormant endeavours to show that this is borne out by Gen. i. 28, and chap. v. 2, and the interpretation has the authority of Jewish tradition, as well in the Targums and Talmud, as in scholars like Moses Maimonides, and Eusebius of Cesarea.

Greek, Polynesian, Zulu, and other accounts.
An ancient Greek account represents Prometheus as making the first man out of earth, or clay and water, and then quickening him with fire stolen from heaven; but earlier accounts limit his work to the latter function, and make men spring up out of the soil. Hesiod describes man in his primitive state as free from sickness and evil before Prometheus stole fire from heaven, and Pandora, who corresponds to Eve, brought miseries to the earth. Prometheus gives man the capability of knowledge; his daring theft is for man the beginning of a fuller and higher life. Æschylus regards Prometheus as

the representative of humanity, led into misery by his self-will, until he submits to the higher will of God. This corresponds with the story of Genesis, save that in the latter the spiritual features are clearer and more distinct.

In Scandinavian mythology, the gods draw the first men from the trunks of trees. In many primitive mythologies, the first man is synonymous with the deity, himself his own creator. The theory of family manes, carried back to tribal gods, leads us naturally upwards to a divine ancestor, or first man. Among the Polynesians, men are sprung from the divine Maui, the Karatongan Tiki, the Tii of the Society Islands, whose son Taata (‘man’) precisely represents a Polynesian Adam, the ancestor of the human race. In the mythology of Kamchatka, one of the sons of Kutka, the creator, is Haetsh, the first man, who after his life on earth descends into Hades to be lord of the under world. The Brazilian tribes refer their origin to Tamoi, the grandfather, the first man, who after living on earth and teaching men to till the soil, ascended to the sky, there to receive the souls of his descendants as they die. The Hindu Yama is not only the first created man, but the first who died, the first to show us the way when our course is run, and our sun sets in the far west. In later Indian theology, he becomes also the awful Judge of the dead, who assembles the souls of men in a house appointed to them for ever. The supreme god of the Dacotah Indians is the creator Unkayhee, who after he had finished the making of the world, took one of his own divine offspring, and grinding him to powder, sprinkled it upon the earth. This produced many worms which matured into infants to become full grown Dacotahs. Similarly, the Jouskeha of the Iroquois was at once creator of the world and father of the human race; and the gods of the Quiches of Guatemala, Tohil, discoverer of fire, Avilisa and Kacavitz, were apotheosised men, who were actual progenitors as well as ancestral deities. The Zulus carry their worship of the manes of the dead back into tribal deities (Unkulunkulu), and beyond those to the original race deity and creator, the First Man—he who ‘broke off in the beginning’ the Old-old-one, the great Unkulunkulu.

Later Jewish, Gnostic, and Moslem Versions.—In Rabbinical and Moslem theology, the first man has hardly more than a place of precedence in Hades or in heaven. Yet even here we find traces of the universal tendency to deify an ideal ancestor; for the Rabbinical Adam is a gigantic being reaching from earth to heaven. Rabbi Jehuda says that as he lay stretched out on earth he covered it completely. Eve’s proportions were correspondingly large. When he was first created, the angels stood in awe of him, and all creatures hastened to worship him. Then God caused a sleep to fall on Adam, and removed a portion of every limb. Thus he lost his vast stature, but remained perfect in every part. His first wife was Lilith; but she fled from him when Eve was created. At the marriage of Adam and Eve, who were of course endowed with every grace, angels were present, some playing on musical instruments; while the sun, moon, and stars danced together. The happiness of the human pair excited envy among the angels, and the seraph Sammael tempted them, and succeeded in bringing them to their fall. The Targum of Jonathan makes Eve created from the thirteenth rib of Adam’s right side; and thus he was furnished with one rib more than any of his descendants. According to the Koran, all the angels paid homage to Adam, except Iblis, who, on account of his refusal, was expelled from Paradise. To gratify his revenge, he tempted them to sin. In the system of the Christian Gnostics,

Adam, the primal man, stands as earthly representative of the Demiurge, and ranks as one of the highest Eons.

Some have tried to establish from the double account of the creation in Genesis that there were two creations of man—the first, a defective race which peopled the whole Gentile world; the second, Adam, from whom the Jews were specially descended. The argument for the pre-Adamite creation will be found in a curious book published in 1655 by Isaac de la Peyroine, a converted Jew, who afterwards, for safety's sake, recanted his errors at Rome.

Science and the Unity of Man.—The question of the unity of man has caused much controversy. The old chronology was set aside when geology and archaeology made it manifest that man existed on the earth many thousands of years ago. This discovery removed the chief difficulty of the *monogenists*, who had to account for the great varieties in the present races of men as having sprung from one common stock within a limited period of time. The *polygenists* pointed to the remarkable permanence of type, in spite of the differentiating conditions of climate and circumstance, to prove that such races as the Negroes, Mongolians, and Whites were distinct species—each sprung from a separate origin in its own region. But fuller knowledge of savage man has demonstrated the essential identity in the working of his mind as well as the structure of his body with the most cultured races; and experience has shown that all the present races, in spite of form and colour are capable of forming crossed races of every combination. Moreover, the modern doctrine of evolution, or the development of species, has confirmed the monogenist theory in insisting against constituting separate species where the differences are moderate enough to be accounted for as due to variation from a single type.

The question of the original unity or diversity of language is not, however, necessarily identical with that of the unity of the human race. For, even allowing mankind to have descended from a single pair, language might not have originated till long after they had passed away; and the formation of language may not have taken place at once, but may have been a gradual process going on for ages. However this may be, the faculty of speech is still one grand mark of distinction between man and the brute; and the fact remains that no anthropoid ape has ever raised himself to the level of articulate speaking man.

The story of Adam has been a rich subject both in literature and art. It was frequently treated by the medieval painters, and formed the material of many mysteries and other poems. Of more modern works, it is enough to mention the splendid epic of Milton, *Paradise Lost*. Here Adam and Eve are the archetypal man and woman, sketched with outlines that can only be compared for grand simplicity with Michael Angelo's two frescoes in the Sistine Chapel, of Adam and of Eve coming into life.

See Tylor's *Primitive Culture* (1871); Darwin's *Descent of Man* (1871); Haeckel's *History of Creation* (trans. by Ray Lankester, 1876); Pesch's *Recess of Man* (trans. 1876); Baudissin's *Studien zur alttestamentlichen Religionsgeschichte* (1876-78); De Quatrefages *The Human Species* (trans. 1879); Professor Sayce's edition of George Smith's *Chaldean Account of Genesis* (1890); vol. i. (1882) of Lenormant's *Les Origines de l'Histoire d'après la Bible*; Schrader's *Kleinigkeiten und das Alte Testament* (2d ed. 1883; Eng. trans. vol. i. 1884); Sayce's *Introduction to the Science of Language* (2d ed. 1883); and Eichhorn's *Mélanges de Critique Biblique* (1886).

Adam of Bremen, an old historical writer, whose work entitled *Gesta Pontificum Hammemburgensium* gives a history of the archbishopric of Hamburg from 788 A.D. to the death of the

Archbishop Adalbert in 1072. It has great historical value; besides notices of ecclesiastical affairs, it gives accounts of the northern Slavonic tribes, which the author collected during a visit to the Danish king Svend-Estrithson. Adam was canon and *magister scholarum* at Bremen from 1069 to the time of his death, which took place in 1075.

Adam, ADOLPHE CHARLES, musical composer, was born in Paris on July 24, 1803, and died in 1856. He was professor of Composition in the Paris Conservatoire from 1848, and also contributed considerably to the newspapers. His best works are his comic operas, among which the chief is the *Postillon de Longjumeau*, produced in 1835, which still keeps the stage as a popular work. He was the successor to the style of Boieldieu, but the frequent triviality of his music marks a stage of the decline of French comic opera to the lower level of opera bouffe.

Adam, ALEXANDER, LL.D., was born near Forres, Elginshire, 24th June 1741. The son of a small farmer, he had to struggle through much hardship in the pursuit of learning; but in 1757 he came to Edinburgh University, and in 1761 obtained the head mastership of Watson's Hospital, and in 1768 the rectorship of the High School. This post he filled for nearly forty years with distinguished ability and success, raising the reputation of the school beyond what it had ever been before. Scott, Horner, and Jeffrey were among his pupils. In some of his forms he encountered such opposition as to make his almost fabulous.

published a new Latin grammar (1772), written in English; but the town council prohibited him from teaching it. His *Roman Antiquities* (1791) was the work which did most to promote his reputation, and for many years was the best manual of the kind in existence. His *Summary of Geography and History* appeared in 1791, his *Classical Biography* in 1800, and his *Latin Dictionary*, an abridgment of a larger work unfinished at his death in 1805. On 18th December 1800 he died of apoplexy, his last words being: 'But it grows dark, boys; you may go.'

Adam, JEAN, a Scottish pietist, was born near Greenock in 1710, and died in the Glasgow poor-house in 1765, after a joyless life, first as school-mistress, then as hawker. Her *Poems* (1734), religious effusions in the Tate and Brady style, by no means support the claim advanced for her to the authorship of 'There's nae Luck about the House,' which, with much more likelihood, is ascribed to Mickle. See a long article in *Athenaeum* for 27th January 1877.

Adam, ROBERT, a distinguished architect, was born at Kirkcaldy in 1728. His father, William Adam of Maryburgh, Fife, who died in 1748, was also an architect of no mean repute. After leaving Edinburgh University, Robert Adam proceeded in 1754 with Clérissé, a French architect, to Italy, and thence to Dalmatia, where he made drawings of the ruins of Diocletian's palace at Spalatro. On his return to Britain, in 1762, he was appointed architect to the king. In opposition to the heavy style of architecture then prevalent, he introduced a taste for lightness and decoration, which, however, tended to the opposite extreme of weakness and triviality. In 1768 he was elected member for Kinross-shire. During upwards of twenty-five years, his practice, in partnership with his brother James, was more extensive than that of any other architect. In 1773 the brothers commenced to publish a series of engravings of their chief designs, which was completed by a posthumous third volume in 1822. Robert died in London 3d March 1792, and was buried in Westminster Abbey. In

Edinburgh his principal works are the Register House, St George's Church, and the University buildings, which last were completed only in 1887 by the addition of a graceful dome. Glasgow owes its Infirmary to him; and London, the Adelphi buildings (so called after the two *brothers*) and the screen to the Admiralty. Other works by him were Caenwood House, Kedleston Hall, Luton House, Lansdowne House, &c.—His nephew, the Right Hon. WILLIAM ADAM of Blair-Adam (1751–1839), sat in parliament as a Whig from 1774 till 1811, and in 1816 was appointed chief-commissioner of the Scottish jury court. He was father of JOHN ADAM (1779–1825), Anglo-Indian statesman, of Admiral Sir CHARLES ADAM (1780–1853), and of General Sir FREDERICK ADAM (1781–1853); whilst Sir Charles was father of WILLIAM PATRICK ADAM (1823–81), for six years Liberal 'whip,' and then governor of Madras for the last few months of his life.

Adam's Apple, the popular name given to the projection in the fore-part of the neck formed by the anterior extremity of the thyroid cartilage of the larynx; so called from the notion that it was caused by a bit of the forbidden fruit which stuck in Adam's throat. The same name is applied to the fruit of a variety of the lime with a kind of depression on the surface, in which the Italian peasants see the mark of Adam's teeth. The name is also used for the Forbidden Fruit (q.v.).

Adam's Bridge, a chain of sand shoals 30 miles long, extending from a small island off the Indian coast to one just off Ceylon. It forms a great obstruction to vessels passing through the channel.

Adam's Peak, the name given by Mohammedans, and after them by Europeans, to a mountain summit in the south of Ceylon, 7420 feet high (not, however, the highest of the group). The native name is Samanella. The cone forming the summit is a naked mass of granite, terminating in a narrow platform, in the middle of which is a hollow, five feet long, having a resemblance (increased by human agency) to a human footstep. Mohammedan tradition makes this the scene of Adam's penitence, after his expulsion from Paradise; he stood 1000 years on one foot, and hence the mark. To the Buddhists the impression is the *Sri-pada*, or sacred footmark, left by Buddha on his departure from Ceylon; and the Hindus recognise Buddha as an avatar of Vishnu. Multitudes of devotees, Buddhist, Hindu, and Mohammedan, visit the mountain.

Adamant, a term now used to express any substance of extraordinary hardness, chiefly a rhetorical or poetical word. The name was attached to a supposed stone or mineral, as to the properties of which vague notions long prevailed. It was identified with the lodestone or magnet, and was often used as synonymous with it by early writers. This confusion ceased with the 17th century, but the word for a long time had a currency among scientific writers as a synonym with diamond. The original of the word is the Gr. *adamas*, originally an adjective meaning 'invincible,' afterwards used as a name of the hardest metal, and also applied by Theophrastus to the hardest crystalline gem then known—the emery-stone of Naxos. Dr Murray says that the early medical Latin writers (apparently explaining the word from *adamare*, 'to take a liking to,' 'have an attraction for') took the *lapide adamanteum* for the lodestone or magnet (an ore of iron, and thus also associated with the ancient metallic sense); and with this confusion the word passed into the modern languages.

Adamantine Spar. See CORUNDUM.

Adamawa, a province of the African Fulah state of Sokoto (q.v.), has an area about equal to that of England. In the south are vast mountain groups, still almost unexplored, amid which rise numerous streams, the most important being the Benué (q.v.), which waters the entire province. The people, who profess Mohammedanism, are active, industrious, and intelligent. The chief town is Yola (12,000 inhabitants).

Adamites, a Gnostic sect of Antinomian tendency, first heard of in Africa in the 2d century. They sought, by abstaining from all indulgences of the senses, to recall the state of innocence men were in before the fall. They therefore rejected marriage, and went naked. Some of their doctrines were in the middle ages adopted by a branch of the Beghards or Brethren of the Free Spirit; especially in Bohemia and Moravia in the 14th and 15th centuries. Ziska made war against them, and slew great numbers; but they were never entirely rooted out.

Adamnan, Columba's biographer, was born about 625, of the race of Hy-Neill, in that part of Ulster which now forms the county of Donegal. Educated at the monastic seminary of Clonard, in his 28th year he joined the Columban brotherhood of Iona, of which, in 679, he was chosen abbot, the ninth in succession to his great kinsman, the founder. In 686 he paid a visit to his friend and pupil, Aldfrid, king of Northumbria, to procure the release of some Irish captives; and during this visit, and another one two years later, he was converted to the Roman views as to the holding of Easter and the shape of the tonsure. Those views he endeavoured to inculcate in Iona, and also in Ireland, which he twice revisited, in 692 and 697; but he failed, at least in Iona, and it is said that mortification at the failure caused his death which befell on 23d September 704, the day of his translation in old Irish and Scottish calendars. He left behind him a Latin treatise 'On the Holy Places' of Palestine and other countries, dictated, he says, by Arculfus, a Frankish bishop, who, returning from a pilgrimage, had been wrecked on the Western Isles. It is valuable as one of our earliest descriptions of Palestine; and three editions of it were published between 1619 and 1734. *Adamnan's Vision*, a professed account of his visit to heaven and hell, is preserved in an Irish MS. of the 12th century, and, with an English translation, was printed in 1870. Whether it was really by Adamnan is open to doubt; but a work that is certainly his, a work of surpassing interest, is the *Vita Sancti Columbae*, his Life of Columba. Along with miracles and many stories palpably incredible, this book reveals a great deal of distinct and minute matter concerning the remarkable community to which both the author and his hero belonged. The standard edition, from an 8th century codex discovered at Schaffhausen in 1845, is that edited by Dr Reeves in 1857 for the Bannatyne Society of Edinburgh, and the Irish Archaeological Society, which (with an English trans.) forms the sixth vol. (1874) of *Scottish Historians*. Nearly all the information to be had about the early Scots-Irish Church is comprised in that volume.

Adams, CHARLES FRANCIS, an American diplomatist, the son of John Quincy Adams, was born in Boston on the 18th of August 1807. He passed his childhood mostly in St Petersburg and London, graduated at Harvard, studied law, and was admitted to the bar in 1828. He served for five years in the legislature of Massachusetts. He was nominated at Buffalo, in August 1848, for the office of vice-president by the convention of Free-soilers. In 1858, and again in 1860, he was elected to congress for Massachusetts. In 1861 he was

appointed minister to England, where he acquitted himself with credit in the difficult and important controversies that arose between his government and Great Britain during the great civil war in the United States. He resigned this office in 1868, and was appointed an arbitrator in the Alabama claims tribunal at Geneva (1871-72). He published the *Life and Works of John Adams* (10 vols. 1850-56). He died November 21, 1886.

Adams, JOHN, a distinguished American statesman, the second president of the United States, was born in Braintree, about 10 miles from Boston, in the then British colony of Massachusetts Bay on the 19th of October 1735, old style. He was the eldest son of John Adams, a farmer in comfortable circumstances, and distinguished himself at Harvard College. He at first intended to become a minister, but the orthodox teachings of that day 'drove him from the profession of divinity to that of the law.' After his graduation in 1755, he was master of a school for three years at Worcester, Massachusetts, studying law meanwhile, and was admitted to the bar in 1758. For the practice of the law, he was pre-eminently qualified by these natural endowments—a sound constitution of body, a clear and sonorous voice, a ready elocution and intrepid courage, characteristics which served him in excellent stead in the stormy political career which he was destined to pass through.

In 1768 Adams removed from Braintree to Boston—then a town of about 16,000 inhabitants—where he soon acquired 'more business at the bar than any other lawyer in the province.' Soon after his settlement in Boston, the Attorney-general of the province (an officer of the crown) tendered him the post of Advocate-general in the Court of Admiralty, an offer which his ardent sympathies with the colonists, as against the crown, constrained him to decline. Important questions touching the rights and duties of the colonies under the crown were at this time being freely debated, and Adams is credited with having struck the key note of the revolution which separated the colonies from the mother-country, by protesting before the governor and council in 1765, against the enforcement of the Stamp Act, and against any right of parliament to tax the colonies without their consent. Although one of the most resolute and prominent of the advocates of the popular cause, he appears never to have countenanced or encouraged those violent excesses of the colonists which ended in coercive measures on the part of the crown; and when, in March 1770, some soldiers stationed in Boston fired on a mob and killed several persons, his sense of duty induced him to imperil his popularity by acting as counsel for the soldiers, who were tried for murder. In the same year the people of Boston elected him a member of the general court (the legislature); but his health failing, he withdrew from public life, and removed his residence, in 1771, to Braintree. Meanwhile he was chosen one of the five delegates from Massachusetts to the Continental Congress, which met at Philadelphia in September 1774.

Here he found a fit arena for the exercise of those great talents, both for business and debate, which ultimately raised him to the leadership of that body. He proposed and secured the election of George Washington as commander-in-chief of the Continental Army; he carried (May 1776) a resolution that the colonies should assume the duty of self-government; and on the 7th of June seconded a motion made by Richard Henry Lee, of Virginia, that these colonies 'are and of right ought to be free and independent states.' The support on the

floor of congress of this motion and of the 'Declaration of Independence' which followed, devolved mainly upon Adams, who, in the face of a sturdy opposition, acquitted himself with such ability as to lead Jefferson to style him 'The Colossus of that debate.'

The public duties which devolved upon Adams after the passing of the Declaration of Independence in congress are reported as something enormous. He was appointed president of the Board of War, and a member of upwards of ninety committees, of twenty-five of which he was chairman. He records that he was kept constantly at work from four o'clock in the morning until ten at night. After months of these incessant labours, he was granted a long vacation in the winter of 1776-7, and finally retired from congress in November of the latter year. He was, however, immediately appointed a commissioner at the court of France, from which he returned in 1779, and took part in a convention to frame a constitution for the state of Massachusetts. In November he again embarked for Europe, armed with powers from congress to negotiate a treaty of peace and commerce with the mother-country (with which the colonies were still at war); but the object of his mission becoming known at Paris, the jealousy of the French ministry was aroused, and through their influence his powers were revoked. He next visited Amsterdam, in an endeavour to interest Dutch capitalists in the cause of his country; and in January 1781 he was authorised to represent the colonies at the court of Holland. Meanwhile a new commission, consisting of Adams and four coadjutors, had been appointed by the American congress to settle the terms of peace between the United States and the mother-country, and on the 3d of September 1783 the treaty was signed. In 1785 Adams was appointed minister to England, a position which he held until he was recalled, at his own request, in 1788. While in London, he published his *Defence of the Constitution and Government of the United States* (3 vols. 1787).

In 1789 he became vice-president of the United States—General Washington being inaugurated president. Washington and Adams were re-elected in 1792; and at the close of their administration in 1796, Adams was chosen president by the Federalists. Thomas Jefferson, the republican candidate for the presidency, becoming vice-president. An administration chiefly noted for fierce dissensions among the leaders of the Federal party, especially for a bitter hostility between Adams and Alexander Hamilton, was followed by the defeat of Adams (who had become a candidate for re-election) in 1800, and the election of Jefferson and Aaron Burr, the democratic candidates, as president and vice-president. Chagrined at his defeat, and burdened with a sense of what he deemed his undeserved unpopularity among the members of his own party, Mr Adams now retired to his home at Quincy, Massachusetts, where he passed the remainder of his life in comparative obscurity. He died July 1, 1826.

See *Works of John Adams*, edited by his grandson, C. F. Adams (10 vols. 1850-1856); *Life of John Adams*, by J. Q. Adams and C. F. Adams (2 vols. 1871); *John Adams* (American Statesmen Series), by John T. Morse, jun. (1885).

Adams, JOHN COUCH, discoverer, simultaneously with Leverrier, of the planet Neptune, was born near Launceston in Cornwall, 1819. He was sent in 1839 to St John's College, Cambridge, where, in 1843, he attained the honour of senior wrangler, and became a mathematical tutor. Soon after taking his degree, he undertook to find out the cause of the irregularities in the motion of Uranus, anticipating, indeed, his own and Leverrier's dis-

covery—that they are due to the influence of a then unknown planet. Leverrier did not commence his researches till the summer of 1845; but on the 10th of November published the results of his calculations, assigning to the unknown planet almost the same place as Adams had done in a paper which he left with the Astronomer Royal at Greenwich Observatory in the previous October, but which he neglected to publish. Leverrier thus acquired a larger share in the honour of the discovery; but the merit of Adams is not less, and the council of the Royal Astronomical Society awarded equal honours to both in 1848. Neptune was actually observed, near the place assigned, by Galle at Berlin in September 1846. In 1858 Adams was appointed to the chair of mathematics in St Andrews, which, however, he vacated within a few months, on being nominated to the Lowndean Professorship of Astronomy, Cambridge. He has made important researches as to the secular acceleration of the moon's mean motion, and on the theory of the November meteors.

ADAMS, JOHN QUINCY, an American statesman, the son of President John Adams, and himself the sixth president of the United States, was born in the parish of North Braintree (now Quincy), in the colony of Massachusetts Bay, July 11, 1767. When eleven years old, he accompanied his father on a diplomatic journey to Paris, and at the age of fourteen became private secretary to Francis Dana, the envoy from the United States to St Petersburg. He was secretary to the commission which negotiated the treaty of peace between the colonies and the mother-country; but when, in 1785, his father received the appointment of minister to the court of St James's, Adams returned to America, and entered the junior class of Harvard College. He graduated in 1787, studied law, and was admitted to the bar in 1790. In 1794 he received from President Washington the appointment of minister resident at the Hague; was afterwards sent to the court of St James's; was nominated by Washington as minister to Portugal; and on the accession of the elder Adams to the presidency, was appointed minister to Prussia. In 1802 he was chosen state senator by the Federalists of his district, and in 1803 was elected to the United States senate from Massachusetts. Here he gradually rose into a position of influence, though often jeopardising his popularity with his own party by acting with the opposition.

In 1806 he boldly denounced in the senate the right claimed by the British government of searching and confiscating the cargoes of neutral vessels bound for countries with which the British were at war, and introduced resolutions (which were supported by the republicans) requesting the president to demand the restoration of property so confiscated. This position thoroughly alienated Adams from the Federal party, and the Massachusetts legislature expressing its disapproval of his course by prematurely electing his successor, he promptly resigned his seat in the senate. In 1809 he was appointed minister to St Petersburg by President Madison; in 1814, was chosen a member of a commission to negotiate a treaty of peace between Great Britain and the United States, and in the following year became minister at the court of St James's, where he remained until he was recalled in 1817 to assume the duties of secretary of state under President Monroe. In the latter capacity he negotiated with Spain a treaty for the acquisition of Florida by the United States, and for the settlement of the western boundary of Louisiana; and it is claimed that to him belongs the paternity of that policy which denies the right of interference by

European governments in the affairs of the American continents, familiarly known as 'The Monroe Doctrine.'

On the close of Monroe's administration in 1825, Adams was elected president by the House of Representatives—no election having been made by the people. An uneventful administration followed. Failing of an election for a second term, he retired to his home at Quincy, depressed, unhappy, and poor in purse. In 1830 he was elected by the National Republican (afterwards the Whig) party to the lower house of congress, where he became particularly noted as a promoter of the growing anti-slavery sentiments of the Northern States; was ever ready to defend the abstract right of petition, and subjected himself to severe reproaches by constantly laying before the house floods of petitions for the abolition of slavery. One of the ablest of the old school of statesmen, he was returned to each successive congress until his death, which occurred in the Speaker's room of the House of Representatives, February 23, 1848.

His *Memoirs*, comprising portions of his diary from 1795 to 1848, were edited and published by his son, Charles F. Adams, in 12 vols. See *John Quincy Adams* (American Statesmen Series), by John T. Morse (1 vol. 12mo, 1882).

ADAMS, SAMUEL, American statesman, was born at Boston, U.S., September 27, 1722, and graduated at Harvard. He was destined for the Congregationalist ministry, but by his father's misfortunes was obliged to engage in business, which he presently exchanged for a collectorship of taxes. He displayed on all occasions an unflinching zeal for popular rights, and in 1765 was elected by the patriotic party a member of the Massachusetts legislature. He played a prominent part as deputy of his native state in the Philadelphia congress, and signed the Declaration of Independence (1776). He took an active share in framing the constitution of Massachusetts, and was for several years president of its senate. He held the office of its lieutenant governor from 1789 to 1794, and of governor from that time till 1797. He then retired from public life, and died at Boston, October 2, 1802, poor as he had lived. Adams was somewhat narrow-minded and bigoted, both in religion and politics. He was prejudiced against Washington, whose conduct of the war his ignorance of military matters led him to think weak and dilatory. In 1776 he anticipated Napoleon by applying the term, 'a nation of shopkeepers,' to the English. See his *Life*, by Wells (3 vols. Bost. 1865), and Morse (Bost. 1884).

ADAMS, THOMAS, a notable Puritan preacher, of whose personal history few details are precisely known. From 1612 till about 1653 he held charges in Bedfordshire, Buckingham, and London. His most notable works are his sermons and his commentary on 2d Peter. Southey called him 'the prose Shakespeare of Puritan theologians.'

ADAMS, WILLIAM, an English navigator, who was born in 1575 at Gillingham, near Chatham, and who from 1600 till his death in 1620 was resident in Japan, where he was 'in such favour with two emperors as never was any Christian in those parts of the world.' See his *Letters* in vol. i. of *Purchas his Pilgrimes*; also the *Diary* of Richard Cocks (Hakluyt Soc. 1883).

ADAMS, WILLIAM, was born in 1814, and died in 1848 at Bonchurch in the Isle of Wight, having been an Oxford tutor and clergyman (1837-42). He was author of *The Shadow of the Cross* and three other beautiful 'Sacred Allegories,' as also of *The Cherry Stones*, &c.

ADANA, a province in the SE. of Asia Minor, derives its name from its chief city Adana, containing 30,000 inhabitants. The city, on the

Sihun, 30 miles from the sea, commands the pass of the Taurus Mountains, and carries on a considerable trade between Syria and Asia Minor.

Adanson. MICHEL, a celebrated French botanist, born at Aix, April 7, 1727. He soon left the clerical profession, for which he was educated, and devoted himself to the study of natural history. In his early career, he entertained the ambition of superseding the Linnean system by a clearer and more comprehensive method of arrangement. When about 21 years old, he went to Senegal in Africa, and stayed there five years, afterwards returning to France with a large collection of specimens in natural history. He published, in 1757, his *Histoire Naturelle du Senegal*, and, in 1763, his *Familles des Plantes*, in which he endeavoured to give a new form to botany, the classification being based on the similarity of the several organs of the plants; but he could not prevail against the established Linnean system. His next undertaking was nothing less than a complete encyclopædia; but his bold plan, towards which he had completed over 100 volumes of manuscript, received little substantial encouragement. During the Revolution he fell into great poverty; afterwards he received a pension, and until the time of his death, August 3, 1806, he was earnestly devoted to the prosecution of his plan. He published also numerous monographs on plants and animals.

Adansonia. See BAOBAB.

Adaptation, a term applied in the theory of evolution to the process by which organisms are adjusted to the conditions of their life. Changes in the conditions effect passive modifications of the plant or animal, while variations within the organism are expressed in active adjustment to the outer world. These progressive modifications are preserved and increased by inheritance through a series of generations, and further developed, according to Darwin, by natural selection. The perfected result of adaptation is a life in harmony with the environment. See DARWINISM. ENVIRONMENT. EVOLUTION. VARIATION.

Adda, the Lat. *Addua*, a river of Lombardy, rising in the Rhaetian Alps. It flows through the Lake of Como, traverses the plain of Lombardy, and passing Lodi, falls into the Po about 8 miles above Cremona, after a course of 180 miles.

Adder, a common English name of the Viper (q.v.), but also often more vaguely used for poisonous serpents of the family Viperidae. A very venomous serpent of New South Wales (*Acanthopsis tortor*) is sometimes called the *Death* or *Black Adder*. In North America various harmless serpents are locally misnamed adders. The word was *ædre* in Anglo-Saxon; the present form arose through mistaking a *wadder* for an *add*.

Addiscombe, a place in Surrey, near Croydon. A mansion here was, in 1812, converted by the East India Company into a college for their cadets, but sold in 1861.

Addison. JOSEPH, was born on the 1st May 1672. He was the eldest son of Lancelot Addison, then rector of Milton, in Wiltshire, and afterwards dean of Lichfield. In June, his wife, daughter of Dr Nathaniel Gulston. He was educated at Amesbury, at a grammar-school in Lichfield, and afterwards at the Charterhouse, from which in his sixteenth year, he passed to Queen's College, Oxford. Having obtained a demyship at Magdalen, he proceeded to his Master's degree in 1688, and in the same year began his literary career with a poetical address to Dryden. Next year appeared his *Account of the Greatest English Poets*, and a translation of the

fourth book of the *Georgics*, with an Essay on that poem. Through Dryden, he became acquainted with Jacob Tounson, the publisher, and by him was introduced to Charles Montague and Somers, at whose suggestion, probably, he wrote in 1695 his complimentary *Address to King William*. In 1697 he was elected probationary fellow of his college, and would in the regular course have been obliged to take orders, had not Montague, who wished him to enter political life, prevailed on the president not to insist on the fulfilment of this condition. Through the influence of Montague, he obtained in 1699 a pension from the crown of £300, for the purpose of enlarging his experience by continental travel. He spent four years in France, Italy, Austria, Germany, and Holland, during which period he wrote his *Letter to Lord Halifax*, and made notes for his *Remarks on Several Parts of Italy*, and his *Dialogue on Medals*. He returned to England in the autumn of 1703. His chief patron, Halifax, having been removed by Queen Anne, on her accession, from the Privy Council, he was now without hope of political advancement, and was apparently reduced to a state approaching poverty, when he was invited by the ministry, acting on the advice of Halifax, to commemorate in verse the victory of Blenheim. This was the origin of *The Campaign*, written in 1704, in return for which he received a commissionership of appeal in Excise.

In 1706 he was promoted to be under secretary of state, first to Sir Charles Hedges, and, after his removal, to the Earl of Sunderland. While acting in this capacity, he produced his opera *Rosamond*, which was performed, but without much success, in April 1706. In 1707 he attended Lord Halifax to the court of Hanover, whither the latter was sent to carry the Act for the Naturalisation of the Electress Sophia. When the Earl of Sunderland was replaced in 1708 by Lord Dartmouth, Addison found himself without employment, but he was almost at once appointed by Lord Wharton, who at that time became lord lieutenant of Ireland, to the post of secretary. In this year he was also elected member of parliament for Lostwithiel, and on that election being invalidated, was chosen to represent Malinebury. While he was secretary in Ireland, he formed a warm friendship with Swift, who frequently mentions him with affection in his *Journal to Stella*, and regrets the estrangement which afterwards grew up in consequence of their party differences. He also contributed largely to the *Tatler*, which had been started by his friend Steele in 1709; 41 papers being wholly by Addison, and 34 by him and Steele conjointly. The Whig ministry fell in the autumn of 1710, and Addison had to vacate his appointment, though he was allowed to keep, apparently through Swift's influence, the keepership of the records in Bermingham's Tower, a place worth £400 a year. In March 1711 was founded the *Spectator*, 274 numbers of which, namely those signed with one of the letters C L L O, were the work of Addison.

His fortune was now so much augmented, that in 1711 he was enabled to purchase for £10,000 the estate of Bilton, near Rugby. While he was on his travels, he had written four acts of his tragedy, *Cato*, which his political friends, perceiving that it would be valuable for party purposes, persuaded him in 1713 to finish for the stage. It was acted on the 14th of April 1713 and in consequence of the vehement party-spirit of the times, aroused such enthusiasm, that it kept the stage for thirty-five nights. When the Treaty of Utrecht was signed, Addison, in promotion of Whig interests, attacked its commercial policy in a pamphlet called *The Late Trial and Conviction of Count Tariff*. These party services gave him great consideration with the Whigs, and on the death of Queen Anne in August

1714, he was named secretary to the lord-justices appointed provisionally to administer affairs. After the accession of George I., he became once more chief secretary for Ireland under the Earl of Sunderland as lord-lieutenant, holding the appointment till August 1715. In this year, a suspicion that he was the author of Tickell's translation of the first book of the *Iliad*, brought him into collision with Pope, who afterwards satirised him in the famous character of Attiens, declaring, in all probability falsely, that he had actually sent the verses to Addison himself. He also wrote his comedy of *The Drummer*, which was acted without success at Drury Lane; and, in order to reconcile the nation to the accession of the House of Brunswick, at the instigation of the government he staged the *Freeholder*, which was continued from December 23, 1715, to June 9, 1716. He was soon afterwards made one of the commissioners for trade and colonies, and in August 1716, married Charlotte, Countess of Warwick. A report, in all probability unfounded, as it is inconsistent with the mention of the Countess in Addison's will, says that the marriage was an unhappy one. In April 1717 he was appointed secretary of state, but resigned his post, owing to his failing health, in March 1718. Almost his last literary undertaking was unfortunately a paper war, on the subject of the Peerage Bill of 1719, with his old friend Steele, whose attack on the bill in a series of pamphlets called the *Plebeian*, was answered by Addison in the *Old Whig*. He was suffering at the time from asthma; dropsy soon after supervened; and he died at Holland House, on the 17th of June 1719, at the age of 47.

Addison's literary genius must be judged from different points of view. As a poet, his capacity is very moderate. *The Campaign* professes to be no more than an unadorned recital in verse of Marlborough's exploits; *Cato* is written with great elegance and correctness, but is wanting in dramatic spirit; *The Letter to Lord Halifax* has many fine verses, particularly in the apostrophe to Liberty. As a light essayist he has no equal, and scarcely a second, in English literature. It was his object to form a sound public taste, and to recover the nation from the distracted intellectual state into which it had fallen after the Restoration, by preserving the morality of the Puritans without their fanaticism, and the elegance of the court without its licentiousness. The noble monument of his success is the *Spectator*, a paper in which the foundations of all that is sound and healthy in modern English thought may readily be traced. As an 'abstract and brief chronicle' of the manners of the time, it is incomparable, and the name of Sir Roger de Coverley alone is associated with one of those creations which are instinctively selected as characteristic of the English genius and language. Addison's criticism does not aim at being profound; but in its sobriety and good sense, it afforded precisely the antidote which the age required against the extravagant conceits and false wit which had found favour with the 17th century. The praise of his prose style has been written by Johnson, and it is not exaggerated; his manner reflects the peculiar character of his humour, a singular grace and breeding being conveyed in sentences full of subtle irony, which are balanced without being formal, and though constructed with apparent simplicity defy mechanical imitation. See the *Life*, by Lucy Aikin (1843), and Macanlay's review of it; also Fourthope's *Addison* (1884).

Addison, THOMAS, physician, was born near Newcastle in 1793, and graduated in medicine at Edinburgh in 1815. He settled in London, and in 1837 became physician to Guy's Hospital, where

he was almost equally eminent as investigator and as clinical lecturer. His chief researches were on pneumonia, phthisis, and especially on the Suprarenal Capsules (q.v.) and the somewhat rare disease of those organs since known as *Addison's Disease*. The discovery of this disease was a piece of sound original work, though of no great practical importance. He also wrote on poisons, on the disorders of females, and, with Dr Bright, *Elements of the Practice of Medicine* (vol. i. 1839). He died 29th June 1860.

Addison's Disease. See SUPRARENAL CAPSULES.

Adorsed, or **ADDOSSÉ**, a heraldic term signifying turned back to back.

Address, **FORMS OF**. The following are the correct ceremonious modes of addressing and beginning letters to persons of title or holding offices:

Ambassador, British—Address: 'His Excellency [in other respects according to his rank], H.B.M.'s Ambassador and Plenipotentiary.' Begin: 'Sir,' 'My Lord,' &c., according to rank. Refer personally to as 'Your Excellency.' An Ambassador's wife, when resident abroad, is sometimes, but not very correctly, designated 'Your Excellency.'

Archbishop. 'His Grace the Lord Archbishop of —.' Begin: 'My Lord Archbishop.' Refer to as 'Your Grace.' In formal documents the Archbishop of Canterbury is addressed as 'The Most Reverend Father in God, Edward White, by Divine Providence Lord Archbishop of Canterbury, Primate of all England and Metropolitan; the Archbishop of York as 'The Most Reverend Father in God, William, by Divine permission Lord Archbishop of York, Primate of England and Metropolitan.' But an Irish Archbishop appointed since 1865 is only 'The Most Reverend the Archbishop of —,' unless he happen to be a temporal peer, in which case he is 'The Right Hon. and Most Rev.'

Archdeacon. 'The Venerable the Archdeacon of —.' Begin: 'Venerable Sir.'

Baron. 'The Right Hon. Lord —,' or 'The Lord —.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Baron's Daughter. If unmarried, 'The Hon. [Christian name and surname]. If married, 'The Hon. Mrs. [husband's surname]. Begin: 'Madam.' If married to a Baronet or Knight, 'The Hon. Lady [husband's surname]. Begin: 'My Lady.' If the wife of a peer, or of the son of a Duke or Marquess, address as such.

Baron's Son. 'The Hon. [Christian name and surname]. Begin: 'Sir.' But the eldest sons of Barons in the Peerage of Scotland are usually addressed as 'The Hon. the Master of [peerage title].'

Baron's Son's Wife. 'The Hon. Mrs. [husband's surname], or, if necessary for distinction, the husband's Christian name should also be used. Begin: 'Madam.' If the daughter of an Earl, Marquess, or Duke, address as such.

Baroness, either in her own right or her husband's. 'The Right Hon. the Baroness —,' 'The Right Hon. Lady —,' or 'The Lady —.' Begin: 'My Lady.' Refer to as 'Your Ladyship.'

Baronet. 'Sir [Christian name and surname], Bart.' Commence: 'Sir.'

Baronet's Wife. 'Lady [surname]. Begin: 'Madam.' Refer to as 'Your Ladyship.'

Bishop, Colonial. As Scottish bishop.

Bishop, English. 'The Right Rev. the Lord Bishop of London,' or 'The Lord Bishop of London.' Begin: 'My Lord Bishop.' Refer to as 'Your Lordship.' In formal documents a Bishop is 'The Right Rev. Father in God, Frederick, by Divine permission Lord Bishop of London.'

Bishop, Irish, consecrated before 1868. As English bishop. *Bishop, Irish, consecrated since 1868*. 'The Right Rev. the Bishop of Ossory,' or in case of the Bishops of Meath and Tuam, 'The Most Rev.' Begin: 'Right Rev. Sir,' or 'Most Rev. Sir.'

Bishop, Retired. 'The Right Rev. Bishop —,' or 'The Right Rev. ———, D.D.' Begin: 'Right Rev. Sir.'

Bishop, Scottish. 'The Right Rev. the Bishop of St Andrews, Dunkeld, and Dunblane,' or 'The Right Rev. Bishop Wordsworth.' The Bishop who holds the position of Primus is generally addressed 'The Right

- Rev. the Primus.' The use of 'Lord Bishop' and 'My Lord' is incorrect.
- Bishop, Suffragan**—The Right Rev. the Bishop Suffragan of Bedford.' Begin: 'Right Rev. Sir.'
- Bishops' Wives and Children** have no titles.
- Clergy**—The Rev.' [Christian name and surname]. Begin: 'Rev. Sir.' If son of a Duke or Marquess, 'The Rev. Lord' [Christian name and surname]. If the son of an Earl, Viscount, or Baron, 'The Rev. the Hon.' [Christian name and surname] is beginning to supersede 'The Hon. and Rev.'
- Companion of an Order of Knighthood**—The initials, C.B., C.M.G., C.S.I., or C.I.E., as it may be, are subjoined to the ordinary form of address.
- Consul, British**— — — — —, Esq., H.B.M.'s Agent and Consul-General, 'Consul-General,' 'Consul,' or 'Vice-Consul,' as it may be.
- Countess**—The Right Hon. the Countess of ——. Begin: 'Madam.' Refer to as 'Your Ladyship.'
- Dean**—The Very Rev. the Dean of ——. Begin: 'Very Rev. Sir.'
- Doctor**—The initials D.D., M.D., LL.D., Mus.D., are placed after the ordinary form of address, as 'The Rev. James Macgregor, D.D.,' 'Thomas Keith, Esq., M.D.' But 'The Rev. Dr Macgregor,' 'Dr Thomas Keith,' are also frequently used.
- Dowager**—On the marriage of a peer or Baronet, the widow of the previous holder of the title becomes 'Dowager,' and is addressed 'The Right Hon. the Dowager Countess of —,' 'The Dowager Lady —.' As more than one Dowager may hold the same title, the term is less used than formerly, and the Christian name is instead coming to be employed as a distinction — e.g. 'The Right Hon. Helen Countess of —.'
- Duchess**—Her Grace the Duchess of ——. Begin: 'Madam.' Refer to as 'Your Grace.'
- Duke**—His Grace the Duke of ——. Begin: 'My Lord Duke.' Refer to as 'Your Grace.'
- Duke's Daughter**—The Right Hon. Lady' [Christian name and surname], or 'The Lady' [Christian name and surname], the surname being that of her husband if married. Begin: 'Madam.' Refer to as 'Your Ladyship.' If married to a peer, she is addressed according to her husband's rank only. This, however, does not hold in the case of peers by courtesy: and a Duke's daughter married to the eldest son of an Earl, after the prefix 'Lady,' sometimes takes her own Christian name, followed by her husband's courtesy title.
- Duke's Eldest Son and his Children**—The courtesy title is treated as if it were an actual peerage; his eldest son taking the grandfather's third title, and being addressed as if a peer.
- Duke's Eldest Son's Wife**—As if her husband's courtesy title were an actual peerage.
- Duke's Younger Son**—The Right Hon. Lord' [Christian name and surname], or 'The Lord' [Christian name and surname]. Begin: 'My Lord.' Refer to as 'Your Lordship.'
- Duke's Younger Son's Wife**—The Right Hon. Lady,' or 'The Lady' [husband's Christian name and surname]. Begin: 'Madam.' Refer to as 'Your Ladyship.'
- Earl**—The Right Hon. the Earl of —, or 'The Earl of —.' Begin: 'My Lord.' Refer to as 'Your Lordship.'
- Earl's Daughter**—As Duke's daughter.
- Earl's Eldest Son, and Earl's Eldest Son's Wife**—As if the courtesy title were an actual peerage.
- Earl's Younger Son and his Wife**—As Baron's son and his wife.
- Governor of Colony**—His Excellency [ordinary designation], Governor of —. Begin according to rank, and refer to as 'Your Excellency.'
- Judge, English or Irish**—The Hon. Sir —, if a Knight, or 'The Hon. Mr Justice —.' Begin: 'Sir.' On the bench only he is addressed as 'My Lord' and referred to as 'Your Lordship.'
- Judge of County Court**—His Honour Judge —. When on the bench, referred to as 'Your Honour.'
- Judges, Scottish**—See Lord of Session.
- Justice of Peace in England (not Scotland)**—The Right Worshipful. Referred to when on the bench as 'Your Worship.'
- King**—The King's Most Excellent Majesty.' Begin: 'Sir,' or 'May it please your Majesty,' or 'Lord — presents his duty to Your Majesty.' Refer to as 'Your Majesty.'
- King's Counsel**—append K.C. to ordinary address.
- Knight Bachelor**—As Baronet, except that the word 'Bart.' is omitted.
- Knight of the Bath, of St Michael and St George, or of the Star of India**—'Sir' [Christian name and surname], with the initials G.C.B., K.C.B., K.M.G., or K.S.I., added. Begin: 'Sir.'
- Knight of the Garter, of the Thistle, or of St Patrick**—The initials, K.G., K.T., or K.P., as it may be, are to be added to the address.
- Knight's Wife, whether wife of Knight Bachelor, of the Bath, of St Michael and St George, or of the Star of India**—As Baronet's wife.
- Lord Advocate of Scotland**—The Right Hon. the Lord Advocate.' Usual beginning: 'My Lord,' though 'Sir' is said to be more correct.
- Lord Chancellor**—The Right Hon. the Lord High Chancellor.' Begin and refer to according to rank.
- Lord Chief-Justice**—The Right Hon. the Lord Chief-Justice of England, or 'The Right Hon. Sir —,' Lord Chief-Justice of England.' Begin, if a peer, according to his degree, otherwise as under Judge.
- Lord High Commissioner to the General Assembly**—His Grace the Lord High Commissioner.' Begin according to rank as a peer. Refer to as 'Your Grace.'
- Lord Justice-Clerk**—The Right Hon. the Lord Justice-Clerk.' Begin: 'My Lord.' Refer to as 'Your Lordship.'
- Lord Justice-General of Scotland**—The Right Hon. the Lord Justice-General.' Begin: 'My Lord.' Refer to as 'Your Lordship.'
- Lord Justice of Appeal**—The Right Hon. the Lord Justice —, or 'The Right Hon. Sir —.' Begin and refer to as a Judge.
- Lord Lieutenant of Ireland**—His Grace,' if a Duke; otherwise, 'His Excellency the Lord Lieutenant.' Begin and refer to according to rank as a peer.
- Lord Mayor of London, York, or Dublin**—The Right Hon. the Lord Mayor of London, or 'The Right Hon. —,' Lord Mayor of London.' Begin: 'My Lord.' Refer to as 'Your Lordship.'
- Lord Mayor's Wife**—The Right Hon. the Lady Mayoress of —. Begin: 'Madam.' Refer to as 'Your Ladyship.'
- Lord of Appeal in Ordinary, and his Wife**—As Baron and Barones. Their children have no title.
- Lord of Session in Scotland**—The Hon. Lord —. Begin: 'My Lord.' Refer to as 'Your Lordship.' His wife has no title.
- Lord Provost**—The Right Hon. the Lord Provost of Edinburgh, 'The Hon. the Lord Provost of Glasgow,' 'The Lord Provost of Aberdeen' or of 'Perth.' Begin: 'My Lord Provost,' or 'My Lord.' Refer to as 'Your Lordship.' The Lord Provost's wife has no title.
- Madam of Honour**—The Hon. Miss —. Begin: 'Madam.'
- Marchioness**—The Most Hon. the Marchioness of —. Begin: 'Madam.' Refer to as 'Your Ladyship.'
- Marquess**—The Most Hon. the Marquess of —. Begin: 'My Lord Marquess.' Refer to as 'Your Lordship.'
- Marquess's Daughter**—Like Duke's daughter.
- Marquess's Eldest Son**—Like Duke's eldest son.
- Marquess's Younger Son**—Like Duke's younger son.
- Mayor**—The Right Worshipful the Mayor of —. Address: 'Sir.' Refer to as 'Your Worship.'
- Member of Parliament**—Add M.P. to the usual form of address.
- Minister Resident**— — — — —, Esq. [or according to rank], H.B.M.'s Minister Resident, —.
- Officers in the Army and Navy**—The professional is prefixed to any other rank—e.g. 'Admiral the Right Hon. the Earl of —,' 'Lieut.-Col. Sir — — — — —, K.C.B.' Officers below the rank of Captain in the Army or Commander in the Navy are more generally addressed by their social, not professional rank, followed by the name of the regiment, R.A., R.E., or R.N., as may be.
- Premier**—According to his rank.
- Prince**—If a Duke, 'His Royal Highness the Duke of —.' If not Duke, 'His Royal Highness Prince' [Christian name]. Begin, in either case, 'Sir.' Refer to as 'Your Royal Highness.'
- Princess**—If a Duchess, 'Her Royal Highness the Duchess of —.' If not a Duchess, 'Her Royal

Highness the Princess' [Christian name]. Begin: 'Madam.' Refer to as 'Your Royal Highness.'

Principal of a Scottish University—When a clergyman, 'The Very Rev. the Principal of —,' or 'The Very Rev. Principal' [surname].

Privy Councillor—'The Right Hon.' followed by name or title. Begin and refer to according to rank.

QUEEN—'The Queen's Most Excellent Majesty.' Begin: 'Madam,' or 'May it please Your Majesty.' Otherwise, 'Lord'—presents his duty to Your Majesty.' Refer to as 'Your Majesty.'

Queen's Counsel—Append Q.C. to ordinary address.

Secretary of State—Her Majesty's Principal Secretary of State for the — Department.

Serjeant-at-Law—Serjeant —, or 'Mr Serjeant —.'

Sheriff of London—'The Right Worshipful.'

Vice-Chancellor—As a Judge. Begin: 'Sir.' Address on the Bench as 'My Lord.'

T. hon.—'The Right Hon. the Lord Viscount —,' or 'The Lord Viscount —.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Viscountess—'The Right Hon. the Viscountess —,' or 'The Viscountess —.' Begin: 'Madam.' Refer to as 'Your Ladyship.'

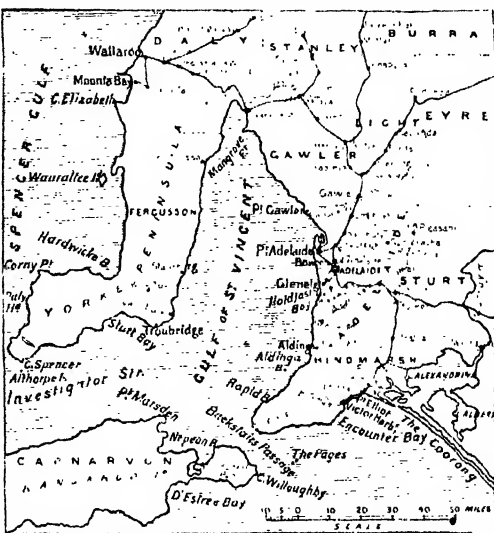
Viscount's Daughter, Son, and Son's Wife—As Baron's daughter, son, and son's wife.

In correspondence with equals or personal friends letters are begun less formally—e.g., 'My dear Lord,' 'Dear Lord —,' 'Dear Sir James.' We are less ceremonious than our ancestors a few generations ago, when letters to the nearest relatives and most intimate friends were begun and ended in the most formal manner. Designations like 'Mrs General —,' 'Mrs Captain —,' 'Mr Dr —,' which were fifty years ago not uncommon, were always improper. Persons holding offices other than those enumerated are addressed in the usual form, 'Sir,' 'Dear Sir,' or 'M^y dear Sir,' according to the more or less formal terms on which the writer may be with his correspondent. A firm is addressed 'Gentlemen,' or 'Dear Sirs.'

Adelaar. CORT SIVERSEN, one of the greatest naval commanders of the 17th century, was born at Brevig, in Norway, in 1622, and in his 20th year was employed in the naval service of Venice against the Turks. On one occasion he broke through a line of sixty-seven Turkish galleys which surrounded his ship, sunk fifteen, and burned several others. Frederick III. secured his services as admiral of the Danish fleet, and employed him. In 1675, under Christian V., he took the command of the whole of the Danish naval force against Sweden, but died suddenly at Copenhagen before the expedition set out.

Adelaide. the capital of the colony of South Australia, is situated on the Torrens, 7 miles SE. of Port Adelaide, on St Vincent Gulf, with which it is connected by railway. Adelaide stands on a large plain, and is walled in on the eastern and southern sides by the Mount Lofty range; the town proper is inclosed by a wide belt of garden and shrubbery. The first settlement was made in 1836, and named after the queen of William IV. The Torrens divides the town into North and South Adelaide, the former being occupied chiefly with residences, and the latter forming the business-portion of the town. Four substantial iron bridges span the bed of the Torrens, which has been formed by a dam into a lake $1\frac{1}{2}$ miles long. The streets are broad and regularly laid out, especially in Adelaide proper, to the south of the river, where they cross each other at right angles, and are planted with trees. Among the public buildings are the new parliament houses, erected at a cost of about £190,000; government offices, post office, and town-hall; South Australian Institute, with museum, library, and art-galleries; and hospital. The botanical garden, with the botanical garden park, covers more than 120 acres of ground.

Adelaide is abundantly supplied with water from reservoirs several miles distant. The chief manufactures are woollen, leather, iron, and earthenware goods; but the chief importance of Adelaide depends on its being the great emporium for South Australia. Wool, wine, wheat, flour, and copper ore are the staple articles of export. Among educational institutions the most important are the Adelaide University; St Peter's (Episcopal) College; St Barnabas Theological College, opened in 1881; and Prince Alfred (Wesleyan) College. It is the seat of an Anglican and a Roman Catholic bishop. Adelaide has telegraphic communication with the other colonies, and is the terminus of the direct line to London, *via* Port Darwin. Glenelg on the sea, 5 miles away, is a favourite watering-place.



Pop. (1871) 27,208; (1881) exclusive of suburbs, 38,479. Estimated pop. within 10 miles' radius of post office, 60,000. PORT ADELAIDE, its haven, dates from 1840, is situated on an estuary of the Gulf of St Vincent, has a safe and commodious harbour, and an ocean dock capable of admitting ships of the largest size. It is a principal port of call for vessels arriving from Europe either round the Cape or by the Suez Canal; and since 1887 railway communication has been established between Adelaide, Melbourne, Sydney, and Brisbane. Passengers and mails for all parts of Australia can accordingly be landed here. Two forts have been erected for the defence of the port. Tramways were introduced in 1878. Municipal pop. (1881) 3000.

Adelsberg, a market-town in Carniola, 22 miles NE. of Trieste, with a pop. of 1800. Near it are numerous caves, the most famous being a large stalactite cavern, the *Adelsberg Grotto*. This cavern, the largest in Europe, is divided into the old and the new grotto, the latter discovered in 1816. The old grotto is 858 feet in length; the new, 8550 feet. The various chambers, called by names such as the Dome, the Dancing-hall, the Belvedere, contain stalactites and stalagmites of great size and grotesque forms. The river Poik runs through a part of the grotto, and then disappears below the ground. In its waters the Proteus (q.v.) is found.

Adelung, JOHANN CHRISTOPH, a distinguished linguist and lexicographer, was born 1732, in Pomerania, and died September 10, 1806, at Dresden,

where, since 1787, he had held the office of chief-librarian. His chief works are his *Wörterbuch der Hochdeutschen Mundart* (5 vols. 1774-86), in which he took Dr Johnson as his model; and his *Mithridates oder allgemeine Sprachkunde* (1806), a work on general philology.

Ademption means, in the first place, that if a testator bequeaths a specific article, or property, and then before his death the article or property is destroyed or totally changed in character, either by the act of the testator, or otherwise, then the legatee gets nothing. It is often a question of difficulty to say whether the bequest was really of a specific article - e.g. a bequest of a bond is more probably a bequest of the money in the bond. But ademption is used in a more important sense to denote what is called satisfaction in the law of England - viz. that, when a testator is owing a debt to a creditor, or has promised to pay a provision in a marriage contract, if he gives a legacy to the creditor or person entitled under the contract, that may be taken to extinguish the debt, or to discharge the provision. Various rules have been stated on this subject, but the courts endeavour to ascertain what the testator really meant.

Aden, a peninsula and town on the SW. coast of Arabia, 105 miles E. of the strait of Bab-el-Mandeb, the entrance to the Red Sea. It is in 12° 47' N. lat., 45° 10' E. long., and is a British possession. The peninsula is a mass of volcanic rocks, 5 miles in length from E. to W., the highest point being 1776 feet in height. It is joined to the mainland by a narrow, level, and sandy isthmus. The town is on the eastern shore of the peninsula, stands in the crater of an extinct volcano, and is surrounded by indescribably barren, cinder-like rocks. The main crater is known as the Devil's Punch-bowl. Frequently the heat is intense; but the very dry hot climate, though depressing, is unusually healthy for the tropics. The Romans occupied it in the 1st century A.D. Up to the time of the circumnavigation of Africa, it was the chief mart of Asiatic produce for the Western nations. The Portuguese held it for a short time; but in 1838 it had sunk to be a village of 600 inhabitants. The increasing importance of the Red Sea route to India gave Aden great value as a station for England to hold. Maltreatment of shipwrecked mariners led to English interference and fruitless negotiations with the Arab sultan. In 1839, after a few hours' contest, Aden fell into the hands of the British. In its medieval prosperity, Aden had a magnificent system of cisterns for collecting rain-water. They had fallen into utter disrepair; but some of them have been restored so as to be serviceable. The present water-supply depends partly on the distillation of sea-water, and is also drawn from these cisterns, from an aqueduct, and from wells sunk to a depth of 120 to 190 feet in the solid rock: all water must be paid for.

Aden is of very great importance to Britain both in a mercantile and naval point of view, especially as a great coaling station; it has a garrison and strong fortifications. The population and resources of the place have rapidly increased since 1838, and the opening of the Suez Canal in 1869 gave it a great impetus. The annual value of its imports sometimes exceeds two millions, while that of its exports (coffee, gums, spices) amounts to a million and a half. It is a telegraphic station on the cable between Suez and Bombay, and on the line to Zanzibar and the Cape. To provide for its growing population, a considerable territory on the mainland has been acquired and added to the peninsula, the total area being 66 sq. m.; and the settlement, which

is politically connected with Bombay (seven days' sailing distant), had in 1881 a population of 34,711, of whom 2600 were Christians, and as many Hindus, with 2000 Jews. The bulk of the natives are Arabs and Somalis from Africa, all speaking Arabic. In the settlement there are besides Aden proper, called the Camp, or the Crater (whose population cannot for military reasons be allowed to increase much), two other centres of population - Steamer Point, which is cooler than the Crater; and the outlying town of Shaikh Othman, 10 miles towards the interior.

Adenitis (Gr. *adēn*, 'a gland'), and **ANGEIOLEUCITIS** (Gr. *angion*, 'a vessel,' *leukos*, 'white'), are the terms employed in medicine to indicate inflammation of the lymphatic glands and inflammation of the lymphatic vessels respectively. In most instances of inflammation in the absorbent or lymphatic system, the vessels and glands are simultaneously involved. Although there is plenty of evidence, from the examination of the dead body, that inflammation of the lymphatics may occur internally, it is only observed in the living subject in connection with the skin or an ulcerated surface, and is most common in the arm, as the hand is the part most exposed to injury and irritation. The disease usually originates in an open wound of almost any form, as a puncture, cut, or a blister. This wound is directly infected by some morbid matter, as, for example, some local inflammatory product, such as the purid secretion of a sore; but more commonly by some irritating or poisonous matter from without. The inflammation that is thus set up in the lymphatics always extends towards the trunk, never in the opposite direction. The degree of inflammation of the gland may vary from the slight enlargement with tenderness on pressure, to purulent suppuration. The suppuration may not take place till a week or more after the inflammation of the vessels has subsided, and may excite no febrile or other constitutional symptoms; and a patient may be quite unconscious that there is anything serious the matter with him, when half a pint or more of matter may be collecting in and around a gland in the armpit. The constitutional symptoms attending an attack of acute inflammation of the lymphatic vessels (*angiolymphitis*) are often severe.

Adenocarcinoma (Gr. *adēn*, 'a gland,' and *karkōn*, 'a tumour'), or **ADENOCARCINOMA**, terms employed in surgery to indicate a kind of new growth in the female breast, the tissue of which closely resembles the breast-tissue itself. See **BREAST** (Diseases of).

Aderbijan. See **AZERBAIJAN**.

Aderno (ancient *Adranum*), a town of Sicily, 17 miles NW. of Catania. It is situated at the base of Mount Etna, has an ancient Norman tower, now a prison, and several churches. Pop. (1881) 19,180.

Adersbach Rocks, a remarkable labyrinthine group of sandstone rocks situated near the village of Adersbach, in the NE. of Bohemia. The aspect of some parts of the group has been compared to that of a city ruined by a conflagration. There are thousands of curious cones, peaks, and pinnacles (one over 200 feet high); many of which have names such as 'The Praying Monk,' and 'Sugarloaf.' The structure of the rocks has been produced, not by any commotion of the earth, but by the influences of rain, frost, and other atmospheric changes, wearing down the soft sandstone by very deep furrows into fantastic forms.

Adhesion, in Pathology, a vital union between two surfaces of a living body which have been either naturally or artificially separated. In the heading of Wounds (q.v.), it is usually an altogether

beneficial process; though even in this case it may cause deformity—e.g. when adjacent surfaces of two fingers are allowed to become united by adhesion after a burn. After injuries to joints, adhesion frequently takes place between the injured structures and those adjoining, which may cause subsequent stiffness. Adhesion is a frequent consequence of inflammation of serous and synovial membranes—e.g. Pleurisy (q.v.) may cause adhesion of the lung to the chest-wall; inflammation of a Bursa (q.v.) may lead to its obliteration by adhesion of its opposing surfaces. In inflammation of mucous membranes it is rare.

Adhesion, in Physics. See COHESION.

Adiabene, a district of Assyria, E. of the Upper Tigris, between the greater and the lesser Zab rivers.

Adiantum. See MAIDENHAIR.

Adiaphora (Gr.), things indifferent which men might or might not do without violation of the law of God. The name was specially applied during the Protestant controversy in Germany to certain customs in use in the ritual of the Romish Church, which were declared things indifferent—of which the use was an open question—by the Leipzig interim of 1548. The most important of these were episcopal jurisdiction, and the use in religious worship of pictures, candles, surplices, Latin hymns and vespers. These Melancthon and his party were ready to accept for the sake of the harmony of the church, while more strenuous Lutherans saw in such conformity a renunciation of the faith.

Adige (Ger. *Etsch*; ancient *Athēsis*), after the Po, the most important river in Italy, rises in the Rhaetian Alps, and is formed by various streamlets which descend from these mountains and unite at Glarus. From Glarus it flows east into Tyrol, then, after a slight *détour* to the south-east, it flows due south past Trent and Rovereto into Lombardy, and, passing Verona, takes a south-eastern sweep, discharging its waters into the Adriatic, not far north of the Po. It is very rapid, and subject to sudden swellings and overflows, which cause great damage to the surrounding country. Its banks have repeatedly been the scenes of bloody engagements. Its length is about 250 miles; its breadth in the plain of Lombardy, 650 feet; its depth, from 10 to 16 feet. It is navigable as far as Trent, but the navigation is difficult, on account of the swiftness of the current.

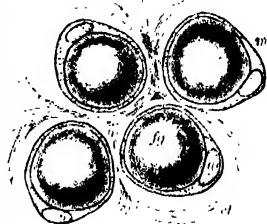
Adi Granth, the sacred books of the Sikhs (q.v.).

Adipic Acid, $C_6H_8(COOH)_4$, is a dibasic acid of the oxalic series, having the general formula $C_nH_{2n-2}O_4$; and is obtained in the form of white, opaque, hemispherical nodules (which are probably aggregations of small crystals), by the oxidising action of nitric acid on oleic acid, suet, spermaceti, and other fatty bodies. It derives its name from the Latin *adeps*, fat.

Adipocere (Lat. *adeps*, 'fat' and *cera*, 'wax'), a substance resembling a mixture of fat and wax, and resulting from the decomposition of animal bodies in moist places or under water. Human bodies have been found, on disinterment, reduced to this state. Lean beef kept under running water for three weeks was found reduced to a fatty substance. A piece of a liver that has suffered what is called fatty degeneration, if immersed for some time in water, is said to become exactly like adipocere.

Adipose Tissue consists of an aggregation of minute spherical pouches or vesicles filled with fat or oil. Under the microscope, each vesicle presents a very delicate envelope inclosing a drop of the oily matter. Thus it is that in the living

body the fat, although nearly liquid, is not moved by gravitation, as is the case when the filamentous tissues are infiltrated by the water of dropsy. It is copiously supplied with capillary blood-vessels, but no nerves have been seen to end in it, and thus it may be punctured without causing pain. Adipose tissue is widely distributed throughout the body. It occurs as the yellow marrow of bones. A considerable layer is found under the skin, where it serves to give smoothness and roundness to the contour, and, being a bad conductor of heat, it is specially valuable in retaining the warmth of the bodies of animals exposed to great cold, such as whales. Being light and elastic, it forms an excellent packing substance; hence it is found surrounding large vessels and nerves, in the omentum and mesentery, round the kidneys, joints, &c., where it affords support, and protects from injurious pressure. Its utilisation as a reserve supply of nutriment is well illustrated in hibernating animals like the hedgehog.



Fat Cells (highly magnified):

en, rous envelope; n, clear cell; f, fat globule; ct, connective tissue. Blood-vessels not represented.

Adirondack Mountains, the chief range in New York State, lie between Lakes Champlain and Ontario, and extend from the N.E. corner of the state towards its centre. Rising from an elevated plateau about 2000 feet above sea-level, they are remarkable for grand and picturesque scenery; the highest summit, Mount Marcy, is 5402 feet high. Small lakes are numerous; the head-streams of the Hudson are here; and there is much fine timber in the region. The discovery of magnetic iron in the township of Macomb, led to the establishment of the village of Adirondack, but the works were afterwards abandoned. The whole northern wilderness of New York State is popularly known as the Adirondacks, and is a very favourite resort of sportsmen and pleasure-seekers.

Adjudication, in English law, means an order of the Bankruptcy Court, adjudging the debtor to be a bankrupt, and transferring his property to a trustee, under the Bankruptcy Act, 1883. It generally proceeds on a resolution of creditors, and may be avoided by an offer of composition or arrangement (see BANKRUPTCY). The equivalent in Scotland is a decree of sequestration. Adjudication has a totally different meaning in the law of Scotland. It is a proceeding in court to take the heritable property of a debtor in satisfaction of debt, or to make up a title to heritable property where an agreement has been made to transfer it, and also in certain cases of intestacy.

In the United States, adjudication is used generally as the act or process of trying and determining judicially; it is the judgment of a court. Adjudication is also used specifically as the act of a court declaring a person bankrupt.

Adjustment of Average is a term used mainly in Marine Insurance, but also in Fire Insurance, to denote the ascertainment of the amount which the insured is entitled to receive under the policy, and of the proportion of the loss to be borne by each underwriter. For the principles on which this adjustment takes place, see INSURANCE (Marine and Fire). It is generally done by the brokers or the agents of the assured, or the matter may be referred to arbitration. The nature and amount of

damage being ascertained, an indorsement is made on the back of the policy, declaring the proportion of loss falling on each underwriter; and on this indorsement being signed or initialled by the latter, the loss is said to have been adjusted. Unless made under a serious mistake as to facts, this signature or initialling binds the underwriter both in a question with the insured and with the other underwriters. Adjustment of *General Average* is a complicated and technical process conducted by experts. See *AVERAGE*.

In the United States, the adjustment, to be binding, must be intended by the parties to be absolute and final. No specific form is necessary; it may be made by indorsement on the policy, by payment of the loss, or the acceptance of an abandonment. Fraud on the part of either party will vitiate an adjustment. If one party is led into a mistake of fact by the fault of the other party, the adjustment will not bind him.

Adjutant, an officer not above the rank of major, specially appointed to assist the officer commanding a regiment or corps. In the field he acts as aide-de-camp, and in quarters has charge of official correspondence, drill, discipline, and all military matters; keeps and regulates the officers' duty roster (or list), issues daily orders by the commanding officer's authority, prosecutes on all courts-martial, supervises the sergeants' mess, has charge of the orderly-room (or colonel's office), and all records and returns prepared there, and is generally responsible for the efficiency of the corps in every particular. The appointment is held for four years, and may be extended for six months longer. *Adjutants of Auxiliary Forces* are officers of line battalions appointed by the commander-in-chief for a term of five years. -- *Adjutants of Depôts* are appointed for three years, when adjutants of militia are not available for the duties of the depôt. -- *Adjutant of Brigade*, or brigade-major, is the staff officer of a brigade. He keeps the roster of brigade duties, and inspects all guards, outposts, and pickets furnished by the brigade. He, or an orderly-adjutant (*Adjutant of the Day*), is required to be constantly in the camp or barracks, and all reports and correspondence for the information of the brigadier-general are transmitted through him. -- *Adjutants of Divisions* are field-officers who represent the adjutant-general of the army on the staff of major generals commanding divisions or districts, and are called assistant-adjutant-generals; they are responsible for all military duties, and issue orders by authority of the major-general. -- *The Adjutant-general* is the head of his department on the general staff of the army, and the executive officer of the general-in-chief. He is charged with the discipline and efficiency of the troops, the details of all military duties, and the accuracy of district returns. He issues all orders to the troops in the name and under the authority of the officer in supreme command, and is the official medium for every report, whether of a confidential or of an ordinary nature.

Adjutant (*Leptoptilus argala*), a duck-like bird, common during summer in India. It is especially frequent in the north, and extends southwards to the Malay peninsula. Generally stork-like in appearance, it stands about 5 feet high, and measures 14 or 15 feet from tip to tip of extended wings. The four-sided pointed bill is very large; the head and neck are almost bare; and a sausage-like gape, sometimes 16 inches long, and apparently connected with respiration, hangs down from the base of the neck. While feeding largely on earcasses and offal about the towns, it also fishes for living food, and sometimes devours birds and small mammals. According to popular superstition in

India, the brain of the living bird contains a stone valuable as a poison antidote. The loose under-tail



Adjutant.

feathers of this and of another species (the Marabou stork) are used for decorative purposes.

Adiygurh. See AJAIGARRH.

Adler, NATHAN MARCUS, chief-rabbi, was born at Hanover in 1803, and educated at Göttingen, Erlangen, and Würzburg. He became chief-rabbi of Oldenburg in 1829, of Hanover in 1830, and of the united congregations of the British empire in 1845. His writings are *Sermons on the Jewish Faith*, and *Nathanael's Lager*, a commentary on the Targum of Onkelos. -- HERMAN, son of the preceding, born in Hanover in 1830, graduated B.A. at London in 1859, and Ph.D. at Leipzig two years later. In 1863 he became Principal of the Jews' College in London, and in 1879 as debate chief-rabbi, coadjutor to his father. He has greatly distinguished himself by his learned and spirited defence of his co-religionists in the columns of the *Nineteenth Century* and elsewhere, especially by his vigorous controversy with Professor Goldwin Smith on the subject of the Jews as citizens. Hardly less able were his earlier reply to Colenso's criticism on the Pentateuch, and that to Max Müller, entitled *Is Judaism a Missionary Faith?* A member of the Mansion House Committee for the relief of the Jewish victims of persecution in Russia in 1881-82. Adler visited the conference of leading Jews at Berlin, and afterwards the colonies of Russian refugees in the Holy Land. Other works are *The Jews in England*; *Im Cabiriol*, the *Poet-Philosopher*, &c.

Ad Libitum (in Ital., *a piacere*, or *a piacimento*) is a musical term which implies that the part so marked may be performed according to the taste of the performer, and not necessarily in strict time. When there is an accompaniment to the music thus marked, it must strictly follow the ad libitum time of the principal performer. Ad Libitum also frequently means, that a part for a particular instrument or instruments, in instrumental scores or pianoforte arrangements, may either be played or entirely left out.

Administration, in Politics, is equivalent to the executive government of a state; in England, more especially the Ministry (q.v.). In Law, it is the function of the Administrator (q.v.).

Administrator, in the law of England, is the person to whom the Probate Division of the High Court commits the administration or distribution of the personal estate of a person dying intestate,

or leaving a will in which no executor is named. In the Scottish law, a father is ADMINISTRATOR-IN-LAW for his children, and as such, is their guardian during minority. This power in the father ceases by the child's discontinuing to reside with him, unless he continues to live at the father's expense; and, in the case of daughters, it ceases on their marriage; but by a statute of 1886, the mother has now a right to apply to the court to appoint a guardian, if the husband is not a suitable guardian for the children.

In the United States, an administrator is a person appointed by competent authority to manage and distribute the estate of an intestate. Any person competent to make contracts may be appointed. The husband of a deceased wife, or the wife of a deceased husband, the next of kin, or creditors of the decedent, may be appointed to administer upon the estate. An administrator is generally obliged to give a bond for the faithful performance of the duties therein mentioned. It is the duty of an administrator to file an inventory of the property, and to collect outstanding debts due the estate; as also to pay such bills as are preferred, such as medical attendance, nurse, expenses of burial, and debts due the government. After paying all legal claims, the administrator must make distribution of the residue under direction of the court.

Admiral, the title of the highest rank of naval officers. The office was created by the Arabs in Spain and Sicily, and adopted with the name by Genoese, French, and by the English under Edward III. as 'anyrel of the se,' or 'admirall of the navy.' The function of the English admiral of the sea was not, however, that of a commander, but embraced those general and extensive powers afterwards associated with the title of Lord High Admiral of England—that is, both the administrative functions now vested in the Lords Commissioners of the Admiralty (six in number), and the judicial authority belonging to the present Admiralty Division of the High Court of Justice. The office of Lord High Admiral was last filled by H.R.H. the Duke of Clarence, afterwards William IV. It had previously been under commissioners from 1708 to 1827; and on his resignation in 1828, the office was again put in commission. See ADMIRALTY COURT.

In the British navy the admirals are distinguished into three classes—admirals, vice-admirals, and rear-admirals: the admiral carrying his colour at the main, the vice-admiral at the fore, and the rear-admiral at the mizzen mast-head. In former times, each grade was subdivided into three sections, known as admirals (or vice- or rear-admirals) of the Red, of the White, and of the Blue, respectively. The flag hoisted by the admiral (thence called a flag-officer) agreed in colour with his section; and all the ships under his command carried ensign and pendant of the same hue; but the distinction was otherwise without practical effect, and is now abolished. *Admiral of the Fleet* is a higher rank, conferred at the will of the sovereign. The rates of full or sea pay of flag-officers are as follows: Admiral of the fleet, per day, £6; admiral, £5; vice-admiral, £4; rear-admiral, £3. An admiral commanding in-chief receives £3 a day additional at home, and £4, 10s. abroad as table money. In 1886 there were 74 flag-officers in the British navy—viz. 6 admirals of the fleet, 13 admirals, 21 vice-admirals, and 34 rear-admirals. The number of flag-officers retired and on reserve half-pay is upwards of 250. The admiral of the fleet takes rank with a field-marshal, admirals with generals, vice-admirals with lieutenant-generals, and rear-admirals with major-generals.

In the navy of the United States, no officer of higher rank than captain was commissioned prior to 1862 (with one single exception). In that year

there were authorised to be commissioned 9 rear-admirals on the active list, and 9 on the retired or reserve list. Subsequently, the number on the active list was reduced to 7; the number on the retired list varying from time to time. Rear-admirals have the relative rank of major-generals. The rank of vice-admiral and that of admiral were created in 1864 and 1866 respectively; but it was resolved to allow their grades to become extinct. France has 1 admiral, 25 vice-admirals, and 33 rear-admirals; Germany—1 admiral, 3 vice-admirals, and 7 rear-admirals; Italy 1 admiral, 5 vice-admirals, and 11 rear-admirals.

The word is derived from the Arabic *amir* or *emir*, 'a commander' (as in *Amir-al-Bahr*, 'commander of the sea'). The *d* was introduced into the English and German forms of the word by a mistaken impression which placed it in a line with the numerous words composed with the Latin *ad*. Thus the early English form was *amiral* or *amirial*; and so it is still preserved in French. In Spanish the word is *almirante* or *almirante*; Portuguese, *almirante*; Italian, *ammiraglio*. The word *Admiral* is sometimes used for an admiral's ship, or a large ship—as by Milton. Along the east coast of England the name of *Admiral* is given by the fishermen to one who, by their choice, is recognised leader of a fleet of fishing smacks.

Admiralty, BOARD OF, a government department which has the management of all matters concerning the British navy. It comprises six lords commissioners, who decide collectively on important questions. Besides this collective or corporate action, each has special duties assigned to him. There are two civil or political lords, and four naval or sea lords. The First Lord, who is always a cabinet minister, besides having a general control, is responsible for all business of the Admiralty, and the other members of the Board act as his assistants in the various duties which are divided among them. The First Naval Lord is responsible to the First Lord for the administration of such business as relates to the *personnel* of the navy, and for the movement and condition of the fleet. He also appoints officers in command of ships. The Second Naval Lord assists the First Naval Lord, and appoints junior executive officers. The Junior Naval Lord assists the First Naval Lord, and appoints officers of civil branches. The Controller of the Navy—who has only recently been made a member of the Board—is responsible to the First Lord for business relating to the *material* of the fleet, that is, the building and repairing of ships, and to guns and naval stores. The Civil Lord acts as assistant to the Parliamentary Secretary. Under the lords are the First Secretary (parliamentary), the Second Secretary (permanent), and the Naval Secretary (professional). The Parliamentary and Financial Secretary is responsible to the First Lord for the finance of the department and parliamentary duties. The Permanent Secretary has exclusive charge of the secretariate, under direction of the First Lord. The post of private secretary to the First Lord is an appointment usually held by a post-captain of the Royal Navy. The only lord who necessarily resigns when the prime minister resigns is the First Lord, yet a change of the others frequently takes place. Some statesmen advocate a modified plan: proposing to render a few naval officers of rank *permanent* lords of the Admiralty, and only changing the others on a change of ministry. All delicate or doubtful matters are specially reserved for the First Lord; but in the Board meetings he has only one vote, like the rest, though, from his general parliamentary responsibility, he practically has both an absolute veto and an absolute power of giving action to his views. To the *department* (though not to the Board) belong also a hydro-

grapher, directors of transports, victualling, naval ordnance, navy contracts, and naval construction; an accountant-general, and a medical director-general, with assistants, clerks, and other subordinate officials. The Coast-guard is under the control of the Admiral Superintendent of naval reserves.

Admiralty Courts. The Admiralty Court (whose functions are now exercised by the Probate, Divorce and Admiralty Division of the High Court of Justice, constituted in 1873-5) was created to try and decide maritime causes. Formerly, the maritime courts of England were divided into the *Instance Court* and the *Prize Court*—separate tribunals, though usually presided over by the same judge: the Prize Court existed only during time of war. The jurisdiction in question of booty of war, and the distribution thereof, was in 1865 conferred on the Admiralty Court; and jurisdiction relating to the attack and capture of pirates is vested in the court in this country, and in the vice-admiralty courts in the colonies and foreign possessions. The proceedings of the Admiralty Court, like those in the ecclesiastical courts, were originally based on the civil law, and upon this account it was usually held at Doctors' Commons. But it is merely as the basis of the earlier mercantile codes, such as the Rhodian laws and those of Oleron, and by no means exclusively, that the civil law is of authority in these courts. Questions of the utmost nicety in the law of nations fall to be decided by maritime courts in time of war. The appeal from the Admiralty Court, which was originally to the King in Chancery, is now to the Court of Appeal created by the Judicature Act of 1873-5. Appeals from the vice-admiralty courts in British colonies and dependencies formerly lay to the Admiralty Court in England, but are now carried to the Court of Appeal. The civil jurisdiction of the Admiralty Courts now extends generally (and the county courts also exercise part of it) to disputes between part owners of a ship, suits for mariners' and officers' wages, suits for pilotage, suits on bottomry and respondentia bonds, and relating to salvage, wreck, collision of ships, &c. County courts are expressly prohibited from entertaining questions of prize, questions arising under the act for the suppression of the slave-trade, or questions of Admiralty jurisdiction by way of appeal. In criminal matters, the Admiralty Court formerly took cognisance of piracy and other offences on the sea, or on the coasts beyond the limits of any county, and, concurrently with the common law courts, of certain felonies committed in the main stream of great rivers below the bridges. This criminal jurisdiction is regulated now by the Criminal Law Consolidation Acts generally; and the criminal jurisdiction of the Admiralty Court may be regarded as obsolete. There is a separate Court of Admiralty in Ireland. The Admiralty Court of Scotland has been abolished, and its ordinary jurisdiction transferred to the Court of Session, the Court of Justiciary, and the sheriffs; questions of prizes, captures, condemnations, and the like, being vested exclusively in the Admiralty Division of the High Court in England.

In the United States, the court of original Admiralty jurisdiction is the United States district court. From this court causes may be removed, in certain cases to the circuit, and ultimately to the supreme court. The jurisdiction of Admiralty has been extended beyond that of the English Admiralty Court. Its *civil* jurisdiction extends to cases of salvage bonds of bottomry, respondentia, seamen's wages, seizures under the law of imposts, navigation or trade, cases of prize or ransom, charter-parties, contracts of affreightment between different states or foreign ports, contracts for conveyance of passengers, contracts with material men, jettisons,

maritime contributions and averages, pilotage, surveys of ship and cargo, and generally to all damages and trespasses occurring on the high seas. Its *criminal* jurisdiction extends to all crimes and offences committed on the high seas, or beyond the jurisdiction of any country. Courts of Admiralty, within the limits of their jurisdiction, resemble courts of equity in their practice and modes of proceeding, but are even more free from technical rules.

Admiralty Droits were formerly a portion of the hereditary revenues of the crown, arising from enemies' ships detained in the prospect of a declaration of war, or coming into port in ignorance of the commencement of hostilities, or from such ships as are taken by non-commissioned captors, the proceeds of wrecks, the goods of pirates, and the like. The proceeds of the Droits of Admiralty are now paid into the Exchequer for the public use.

Admiralty Island lies off the coast of Southern Alaska, in 57° 30' N. lat., and 134° 15' W. long. It is about 90 miles long, well wooded and watered; and contains coal and copper. It is inhabited, and belongs to the United States.

Admiralty Islands, a group of 40 islands, to the N.E. of New Guinea, about 2° S. lat., and 147° E. long. They were discovered by the Dutch in 1616. The largest is above 50 miles long, and is mountainous but fruitful; their total area is 878 sq. m. Some are volcanic, others are coral islands. They abound in coconut trees, and are inhabited by a race of tawny frizzle-headed savages, of the Papuan stock, about 800 in number. Together with New Britain and some adjoining groups, they were annexed by Germany in 1885, and now form part of the Bismarck Archipelago.

Adobe (Span. *adobar*, 'to plaster') is a sun-dried brick. These unburnt bricks are commonly used in Mexico, Texas, and Central America; and the houses built with them are very durable.

Adolphus, JOHN, born in London in 1768, was called to the bar in 1807, and became a successful Old Bailey practitioner. He died 16th July 1845. His historical and other works fill upwards of 20 volumes, the chief being a *History of the Reign of George III.* (1802; new ed. 1840-3). See his Life (1871).

Adonai, a Hebrew name for the Supreme Being; a plural form of *Adon*, 'lord,' combined with the pronoun of the first person. In reading the Scriptures aloud, the Jews pronounce 'Adonai' wherever the holy name *JHVH* is found in the text; and the name 'Jehovah' has arisen out of the consonants of *Jhch*, with the vowel points of *Adonai*.

Adoni, a town of the province of Madras, 64 miles N.E. of Bellary. Pop. (1881) 22,441, many of them engaged in weaving.

Adonis, in Greek Mythology, a youth of marvellous beauty, beloved by Aphrodite. He was killed by a boar while hunting, and the goddess, coming too late to his rescue, changed his blood into flowers.—A yearly festival was celebrated in honour of Adonis, and consisted of two parts—a mourning for his departure to the under world, and a rejoicing for his return to Aphrodite. This festival, widely spread among the countries bordering on the Mediterranean, was celebrated with peculiar pomp at Byblos and Alexandria. Before the festival, wheat, fennel, and lettuce were sown in earth, and even in silver pots, and forced by heat; intended to indicate, doubtless, by their brief bloom, the transitoriness of earthly joy. The myths connected with Adonis belong originally to the East. They display a worship of the powers of nature conjoined with that of the heavenly bodies, and Adonis himself

appears to be the god of the solar year. The similarity of the name to the Phœnician *Adon*, which signified 'lord,' is unmistakable; and this word Adon was specially applied to the king of heaven, the sun.

Adonis, a herbaceous annual or perennial genus of Ranunculaceæ, of which only one, *Adonis autumnalis* (Pheasant's Eye), is a doubtful native of Britain. Its bright scarlet petals obtained for it the name of *Flos Adonis*, their colour having been ascribed to their being stained with the blood of Adonis. It is a well-known ornament of our gardens; in which also *Adonis æstivalis* frequently appears, and *Adonis vernalis*, a perennial species common upon the lower hills of Middle and Southern Germany, with early and beautiful flowers.

Adoptianism, a heretical doctrine akin to Nestorianism, originated about the end of the 8th century in Spain. Elipandus, Archbishop of Toledo, and Felix, the Bishop of Urgel, advanced the opinion that Christ, in respect of his divine nature, was doubtless the Son of God; but that as to his human nature, he was only declared and adopted to be the first-born Son of God. The flame of controversy thus kindled, spread into the Frankish empire, and gave occasion to three synods, one held at Ratisbon (792), another at Frankfort (794), and a third at Aix-la-Chapelle (799). Adoptianism was condemned as heresy, and the Catholic doctrine of the unity of the two natures of Christ in one divine person was re-affirmed.

Adoption was a legal institution of much importance in both of the classical nations of antiquity, whose laws frequently encouraged the possession of a large family. Adoption, in the stricter sense, in the Roman law, applied only to the case in which a person in the power of his father or grandfather was transferred to that of the person adopting him. Where the person adopted was already emancipated from the paternal power (*patria potestas*), and was regarded by the law as his own master (*sui juris*), the proceeding was called *adrogatio* (*adrogatio*). At Athens, the adopted child was transferred from his own family and parish or tribe (*phrasis*), into those of the adoptive father, whose property he inherited in the absence of legitimate children, and whose sacred rights he was bound to maintain. In fact, the theory of adoption at Athens, as in India, was that there might be some one to offer the funeral cake, and prevent a failure of the funeral ceremonies. Only Athenian citizens could be adopted, so that not only the next of kin, but the whole community were interested in preventing fraudulent adoptions. With this view, registration in the demos of the adoptive father was requisite, in order to entitle the son to the rights of citizenship as a member of it.

In Rome, the adopted child assumed the name, and became bound to discharge the religious duties, of the adoptive father, which usually consisted in sacrifices to the *penates* or other divinities. Adoption was effected first by the form of a fictitious sale, and then under the authority of a magistrate, the prætor at Rome, or the governor (*proconsul*) in the provinces. *Adrogatio* originally required a vote of the people in the *Comitia Curiata*; but under the emperors, it became the practice to effect it by an imperial rescript. This change of form made possible the adrogation of women. A patrician was sometimes adrogated into a plebeian family for political purposes. If a father, having children in his power, was adopted, both he and his children passed into the power of the adoptive father. It was requisite that the adoptive father should have no legitimate children at the time, and no

reasonable prospect of having any. But the whole character and object of adoption were altered by the legislation of Justinian. Adoption was unknown to the early law of the Teutonic nations; but in the 15th century it became a prominent feature in the codes and social life of Prussia and Austria, and other German states. There, and also in France, the ceremony was carried through in open court, and conferred indefeasible rights of succession. It is, however, in the Hindu law that adoption is chiefly, in modern times, an active institution. Adoption has never existed as an institution either in England or Scotland. The patrimonial benefits of adoption may, however, be conferred by deed, as where a testator is said to place himself *in loco parentis*; but the express adoption of a child—e.g. as the result of the advertisement which frequently appears—imposes no legal liability, except under a contract with the true parent.

In the United States, adoption is regulated by the statutes of the several states. Generally, it is accomplished by mutual obligations, assumed in some form prescribed by law, binding upon the adopter to treat the one adopted as his own child, towards whom he will discharge all the duties of a parent; while the one adopted assumes all the obligations of a child towards a parent. But these laws differ in the several states, although they all aim at one result—viz. the creation of new civil relations of child and parent.

Adour, a French river, rising in the department of Hautes Pyrénées, and flowing 180 miles through Gers and Landes, till it enters the Atlantic below Bayonne. It is navigable for 80 miles.

Adowa, a town of Abyssinia, the capital of Tigré, stands 6270 feet above sea-level, and 145 miles N.E. of Gondar. Adowa is the chief entrepôt of trade between the interior of Tigré and the coast. It has a great weekly market and an extensive transit trade, in which gold, ivory, and slaves are articles of importance. The population varies between 3000 and 20,000, according to the absence or presence of the King.

Adra (ancient *Abdera*), a Mediterranean seaport of Spain, in the province of Almería, 49 miles S.E. of Granada. The ancient Abdera, founded by the Phœnicians, stood on a hill, at whose base the modern town lies in a swampy, unhealthy situation. Lead-mines in the neighbourhood give employment to many of the inhabitants, and trade to the port. Pop. (1877) 11,320.

Adramyti, Greek name of the Turkish *Edremit*, a town on the west coast of Asia Minor, opposite Mitylene, and amid rich olive groves, Pop. 6000. A little to the east lay the ancient *Adramyttium*.

Adrastus, a king of Argos, whose daughter married Polyneices of Thebes, who had been exiled from his native city by his brother Eteocles. He led the expedition of the 'Seven against Thebes' to restore his son-in-law to his right, and was the only one that survived, as Amphiaræus had foretold. Ten years later he led the six sons of the heroes that had fallen to a new attack on Thebes—the war of the *Epigoni* ('descendants'). This time the attack was successful, but a son of Adrastus fell in the struggle, and the father immediately died of grief.

Adria, in the province of Rovigo, Northern Italy, between the rivers Po and Adige, is one of the oldest cities in Europe, having been founded by the Etruscans. So late as the 12th century A.D., it was a flourishing harbour on the Adriatic Sea, to which it gave name; but by the continual deposition of alluvium on the east coast

of Italy, it has been gradually separated from the sea, from which it is now 14 miles distant. It still retains several interesting remains of Etruscan and Roman antiquity, with a fine cathedral. Pop. 7642.

Adrian, a city of Michigan, U.S., situated on the Raisin River. It is well furnished with water-power, commands the trade of a large grain-growing region, has several factories, and a Methodist college founded in 1839. Pop. (1870) 8438; (1880) 7849.

Adrian, the name of six popes (see POPE), none of them very remarkable. Adrian IV. was by birth an Englishman, the only one that ever sat upon the papal chair. His name was Nicolas Breakspear. He was a native of Langley, near St Albans, became first a lay-brother or servant in the monastery of St Rufus, near Avignon, and in 1137 was elected its abbot. His zeal for strict discipline raised a combination to defame his character, and he had to appear before Eugenius III. at Rome. Here he not only cleared himself of all charges, but acquired the esteem of the pope, who appointed him cardinal-bishop of Albano in 1146. In 1154 he was raised to the papal see, one of his early acts being to grant Ireland to King John. Adrian was at first on friendly terms with the Emperor Frederick I.; but his high notions of the papal supremacy, as high even as Gregory VII.'s, led to the beginning of that long contest of the popes against the house of Hohenstaufen, which ended in the destruction of the dynasty. He was about to excommunicate Frederick, when he died at Anagni, 1159.—For the Emperor Adrian, see HADRIAN.

Adrianople (Turkish *Edirne*; Bulgarian *Odin*), the third city of European Turkey, stands on the navigable Maritza (the ancient *Hebrus*), 198 miles WNW. of Constantinople by rail. The city has upwards of 65,000 inhabitants, of whom about one-third are Turks. The splendid mosque of Selim II., the palace, and the immense bazaar of Ali Pasha, may be named as its principal features. It has a silk factory, and a considerable trade in opium, otto of roses, and wine. Founded or greatly improved by the Emperor Hadrian, Adrianople was the seat of the Ottoman sultanate from 1366 to 1453. The Russo-Turkish war was here concluded, September 14, 1829, by the Peace of Adrianople. After the capture of the Turkish army defending the Shipka Pass in January 1878, the Russians entered Adrianople unopposed; and an armistice was concluded here on the 31st.

Adriatic Sea, a large arm of the Mediterranean Sea, extending, in a north-westerly direction, between the east coast of Italy and the west coast of the Balkan peninsula, being terminated to the south by the Strait of Otranto, 45 miles wide. In the north, it forms the Gulf of Venice, and in the north-east, the Gulf of Trieste. The west coast is comparatively low and has few inlets, and the north is marshy and edged with lagoons. On the other side, the coasts of Dalmia, Croatia, Dalmatia, and Albania are steep, rocky, and barren, with many inlets, and begirt with a chain of almost innumerable small rocky islands. The total area of the sea, including islands, is calculated at 52,220 sq. m.; the area of the islands being 1290; the mean depth 110 fathoms, the greatest depth 567 fathoms. The most considerable rivers flowing into the sea are the Adige and the Po, which are continually depositing soil on the coast, so that places once on the shore are now inland. The extreme saltness of the Adriatic is probably owing to the comparatively small quantity of fresh water poured into it by rivers.

Navigation on the Adriatic is safe and pleasant in summer, but in winter the north-east gales (*bora*) are formidable, on account of the rocky and dangerous coasts on the east. Venice, Trieste, Ancona, Bari, and Brindisi are the chief ports; Brindisi having special importance as the terminus of the railway journey on the shortest Overland Route (q.v.). The fisheries of the Adriatic are rich, and industriously worked.

Adule, or ADULIS, an ancient town of Ethiopia, on the Red Sea, or what is now Annesley Bay. It afterwards had some importance as the port of Axum. On its site is the modern village of Zulla. Here was found in the 6th century the *Monumentum Adulitanum*, a Greek inscription of the conquests of Ptolemy II. Energetes.

Adullamites. The attempt to extend the franchise made in 1866 by the government of Earl Russell and Mr Gladstone, led many of the Whigs to secede from the Liberal leaders, and vote with the Conservatives. The designation of *Adullamites* was fastened on the new party, in consequence of Mr Bright having likened them to the political outlaws who took refuge with David in the cave of Adullam (1 Sam. xxii.).

Adulteration. The crime of food adulteration is a very old one. Pliny tells us of one article which was so extensively adulterated in his time, that even the wealthier members of the community could not obtain it in a state of purity. In England during the 11th century, drugs, as well as several different articles of food, were subjected to various processes of sophistication. In those early days, the means of detection of adulteration were, as may be imagined, neither so refined nor certain as those which we now possess, and in consequence notwithstanding the greater punishments which were then enforced—the practice not only became very common, but it was carried out in a most unblushing fashion. In 1843 Mr Phillips, of the Inland Revenue, stated that it was supposed that there were no less than eight manufactories for the purpose of re-drying exhausted tea-leaves in London alone. People were employed to go about and buy up used tea-leaves at hotels, coffee-houses, and the like, which they did at the rate of twopence halfpenny a pound. The leaves gathered in this way were then taken to the manufactories, where they were immersed in a solution of gum, and dried. If the leaves, thus manufactured so far, were intended to be sold as ordinary black tea, they were finished by being mixed with rose-pink and black-lead. But not only was exhausted tea made use of; such things as the leaves of the sycamore, horse-chestnut, and sloe were freely employed and these not alone, but in conjunction with catechu, green vitriol, and indigo. In a notice of Accum's book on food adulteration, published in 1820, the following passage occurs: 'Devoted to disease by baker, butcher, grocer, wine-merchant, spirit-dealer, cheesemonger, pastry-cook, and confectioner, we call in the physician to our assistance. But here again the pernicious system of fraud, as it has given the blow, steps in to defeat the remedy. The unprincipled dealer in drugs and medicines exerts the most potent and diabolical ingenuity in sophisticating the most potent and necessary drugs. Peruvian bark, rhubarb, ipecacuanha, magnesia, calomel, castor-oil, spirits of hartshorn, and almost every other medical commodity in general demand, and chemical preparation used in pharmacy.'

Sixty years of general advancement has no doubt produced a great change in the purity of our food; but the quarterly reports of the public analysts continually remind us that we have not

yet finally banished the demon of food adulteration from our midst. The excuses which have at different times been urged in extenuation of adulteration are numerous, and in some cases even plausible. Thus we are told again and again that many articles of food are prepared and sold in an adulterated form in obedience to the public taste. Preserved vegetables must, it is said, possess a bright, permanent green hue, in order to be appreciated by the public. Peas do not retain their natural colour when preserved, and therefore the manufacturers of these articles colour them with verdigris or some similar salt of copper. Sauces and preserved meats must, it is alleged, be made, for similar reasons, to assume a red tint; butter and cheese must be yellow, and bread white; while confections must needs possess all the colours of the rainbow. Again, it is asserted that some forms of adulteration, or, as it is more euphoniously put, admixture, are quite allowable, seeing that they are undoubted improvements. Thus, it is maintained that to mix chicory with coffee is not only perfectly allowable, but commendable, seeing that the compound is by many considered to be superior to the pure coffee. So with the admixture of such things as flour and turmeric with mustard. As a third form of excuse, we have it openly asserted that certain things must be mixed with others in order to insure their preservation. With such energy, indeed, was this insisted on, that the legislature was actually constrained to legalise an admixture of a certain amount of oil of vitriol with vinegar, in order that thereby there might be conferred upon the latter certain keeping powers, which apparently it was supposed it did not of itself possess. Another excuse frequently made use of is, that it is perfectly impossible to supply pure articles at the current price. Finally, we have frequently the plea advanced that, after all, in many cases it does no harm—as in the addition of water to milk or whisky; therefore thus diluting these substances cannot be regarded as a criminal act.

These excuses are found to be all perfectly invalid. It is possible that one who was unacquainted with the subject, might prefer such things as bright green peas or pickles to those which were more of a yellow tint. If, however, he were informed—as he certainly should be—that the bright, fresh-looking article owed its taking appearance to the presence in it of a poisonous copper salt, it is impossible to suppose that he would still elect to be supplied with it. As to admixtures being improvements, this is of course largely a matter of opinion, but it is worthy of consideration in this connection that the articles which are added by way of improvement are always very much cheaper than the articles which are supposed to have been improved. Thus coffee costs about two shillings per pound, while chicory costs about fourpence. Mustard costs also about two shillings per pound, while flour by the agency of which the mustard is improved, costs about one penny. With reference to the statement that admixture is necessary for the preservation of certain articles, if this is true at all, it is true of very few articles indeed. That it does not apply to vinegar is abundantly proved by the fact that the vinegar now made by most if not all of the better manufacturers does not contain a drop of sulphuric acid. The statement that adulteration is rendered necessary because the public refuse to pay a fair price for pure articles, is manifestly absurd, for it is the traders and not the public who fix the price; and if a trader were only mindful to inform his patrons that, while the purity of the less costly articles sold by himself and his brethren in trade could by no means be guaranteed, that of

those which were a little higher in price was undoubted, he would not have reason long to complain of a want of demand for unadulterated wares. As to such an adulteration as the admixture of water with milk doing no harm, as well might it be said that selling milk by means of a measure which only holds half as much as it is represented to hold, does no harm. We are not thereby poisoned, but we are certainly defrauded as much in one case as in the other.

The objects of employing different materials in the adulteration of food may be said to be three in number. First, for the purpose of increasing the bulk or weight of the dearer article; as, for example, when water is added to milk or whisky, or when chicory is added to coffee, or flour to mustard, or butcher fat to butter. Second, to brighten its colour, or to alter or improve its appearance; as in the case of the addition of certain metallic compounds to preserved fruits or vegetables, or the addition of barley-meal to oatmeal, or of alum to bread. Third, to increase its pungency or alter its flavour; as, for example, when pepper is added to ginger, artificial flavourings to wine or to alcohol, as is done in the manufacture of spurious liquors, such as imitation brandy, &c.

As to the means which the public possesses of preventing the sale of adulterated food, it may be said that before this crime against society can effectually be put an end to, we must be able to do two things. First, we must be able satisfactorily to detect adulteration, however skilfully it may have been done; and second, we must be able to inflict on those proved to have been guilty of the crime such penalties as will render the practice of it unprofitable.

As the detection of the fraud and the consequent exposure often forms in itself the most salutary form of punishment, the subject of the detection of food adulteration becomes a most important one. It is effected mainly by two agencies, chemical analysis and microscopical examination. They are employed for this purpose by a body of well educated, highly trained men, known as public analysts, one of whom is to be found in almost every town of any importance. The duties of these officials, as well as the mode in which they are appointed, will be described in the article ANALYST. Public analysts have not as yet been very long in existence, but the amount of work which they have already done in the way of checking adulteration of food is very great.

It was not until the year 1860 that any general act of parliament dealing with food adulteration was passed into law in Great Britain. Previous to that date, special statutes applying to certain specified articles, such as tea, coffee, bread, and wine, were in force; but the main object of these enactments was to prevent the defrauding of the revenue, the health and protection of the purchaser being apparently a matter of secondary importance. The Act of 1860 did not seem to produce much result, although it remained in force for twelve years. In 1872 another act was passed, which, however, as it was supposed to have been the means of inflicting many real hardships on retail dealers, was superseded by the 'Sale of Food and Drugs Acts' of 1875 and 1879. It is these acts which constitute the existing law on the subject of food adulteration. They are, no doubt, in many respects better than the previous acts, but they are still far from being perfect. One of their most glaring and palpable defects is that though they lay down with commendable minuteness of detail the mode of proving adulteration, together with the penalties to be inflicted when adulteration is proved, they do not, except in the case of one or two descriptions of spirituous liquors, say what adulteration is. It is

really therefore left to the analyst to define (except in a certain general sense) what constitutes adulteration. Analysts, it so happens, are not all at one on this point, so that it is not by any means an impossible circumstance that a substance which might be found to be adulterated, and for the sale of which a man might be fined or imprisoned in one county, would be decided in the adjacent county to be quite pure. What is obviously required in order that the act may be more workable and useful, is that adulteration should be defined in exact and precise terms. The act should set forth exactly what is to be considered as constituting adulteration in each separate article of food, so that when an analysis is obtained, there will be no doubt as to whether the article is pure. For example, if Prussian blue and French chalk are found in tea which has been 'faced,' is the vendor thereof to be prosecuted for having sold an adulterated article? Flour and turmeric added to mustard, starch and sugar to cocoa, and chicory to coffee, are additions which constitute adulteration in the opinion of many authorities, while others do not so regard them. Another defect in the act is the provision that no one shall be guilty of an offence by mixing articles of food with non-deleterious foreign substances, if he intimates the fact to the buyer by a label.

Notwithstanding the efficient services rendered by the many public analysts now at work in different parts of the country, and the numerous prosecutions which are continually taking place for the sale of adulterated food, the practice is still of regrettably frequent occurrence, many articles being habitually sold in a form far from pure. The following list, although it is by no means complete, includes the most important substances which are usually sold in an impure condition.

Milk is not only a most important article of food, but is the one most frequently subjected to adulteration. That it should be so we can easily understand. To conduct the business of a milk-seller but little capital is required; the trade is therefore largely in the hands of the lower class of traders. Then again, the admixture of water with milk, or the abstraction of cream, is not only very easy to perform, but it is also, unless by chemical analysis, very difficult to detect. The two forms of sophistication just mentioned are the only ways in which milk is ever adulterated. All the sensational stories of 'sheep' br and chalk being used for this purpose are purely apocryphal. But though seemingly simple, and as compared with adulteration of other substances, tolerably harmless, this practice of reducing the quantity of milk is really a very serious affair. Of all forms of food, not even excepting bread, milk is the one most largely used. In London alone, very nearly one and a half millions of money are annually paid for milk; and of this sum—according to a recent government return—about one-twentieth part, or from £70,000 to £80,000, is paid for water sold as milk. Judging from official reports made by analysts in different parts of the country, the practice of adulterating milk is carried on extensively in most, if not all the large towns in the kingdom.

The detection of adulteration in milk, unless by means of chemical analysis, is a very difficult matter. It may be done in a rough way either by taking the specific gravity of the milk, or by ascertaining how much cream it will throw up. The former operation is carried out by plunging into the milk, at a temperature of 60° F., an instrument called a hydrometer (q.v.), which sinks in the milk to a greater or less extent, according as the specific gravity is high or low. The second operation is carried out by placing a quantity of the milk to be tested in a long narrow glass tube,

closed at one end, which stands in an upright position, and is graduated into a hundred divisions. Enough milk having been poured in to occupy a hundred divisions, it is allowed to repose in the tube for at least twelve hours. Under these circumstances, the milk will throw up a certain proportion of cream, the exact amount of which can be easily read off by means of the graduated divisions. Good pure milk will throw up a sufficient amount of cream to occupy from twelve to fourteen divisions of the scale, and such milk should have a specific gravity of from 1029 to 1032. Milk from which the cream has been removed will, on the other hand, throw up much less cream than fourteen per cent.; and milk which has been adulterated by being simply mixed with water, will show a lower specific gravity than that given above. It should be observed, however, that if milk shows a high proportion of cream, a low specific gravity does not necessarily indicate dilution with water.

Bread.—Bread and sugar are the purest forms of food with which the public are at present supplied. The only adulteration which we now occasionally find in bread is alum, and possibly occasionally an excessive amount of common salt. The former is added for the purpose of communicating an admired white appearance to the bread, and the latter in order that it may retain an undue proportion of water. The alum, it is alleged, is often added by the miller in order that his inferior produce may yield bread having the appearance of that made from flour of a higher class. Both of these forms of adulteration are to be severely reprobated. Alum, according to many authorities, has the effect of seriously impairing the digestibility of bread; and salt added knowingly in excess of what is necessary is a fraud, whether the allegation that it causes the bread to retain water be true or not.

Alum may be detected in bread by laying a piece about two inches square upon a saucer, and then pouring upon it a small quantity of tincture of logwood, which has previously been mixed with its own bulk of carbonate of ammonia solution. If alum be present, the bread will turn blue by this treatment, whereas, if it be free from any admixture of this kind, it will become pink. Other substances besides alum which might be present in bread, have the effect of producing a blue colour with logwood, so that all we can certainly say as the result of this test is, that if a blue colour is produced, the bread is not pure, and that the impurity most probably is alum.

Other substances said to be used for adulterating bread are rice-flour, bran flour, potatoes, borax, sulphate of copper, sulphate of zinc, chalk, and carbonate of magnesia. These, however, if they are ever employed at all, are employed to a very limited extent only; and in England in recent times, no conviction has been obtained except for admixture of alum.

Coffee is now extensively adulterated, inasmuch as it is becoming a difficult matter to obtain free from admixture. The material most commonly used for adulterating coffee is ground chicory root. It is used for this purpose in enormous quantities, 40 or 50 per cent. being no unusual amount to find in coffee as frequently sold; and occasionally as much as 70, 80, or even 90 per cent. has been shown to be present. Coffee costs about two shillings per pound and chicory about fourpence, so that the temptation to sell a mixture of the two as coffee is very strong. As already mentioned, it is legal to sell the mixture if labelled as such. Chicory may be detected in coffee by allowing a few grains of the suspected article to fall into a glass of cold water. If the coffee is pure, almost all the little

particles will, after one or two minutes, remain hard, and will continue to float on the surface, communicating very little colour to the water. If, on the other hand, chicory or any similar foreign substance be present, many of the little particles will become quite soft, and they will sink to the bottom, colouring the water more or less brown. It is asserted that many other substances besides chicory are occasionally mixed with coffee, such as roasted wheat and beans, rye and potato flour, acorns, ground date-stones, and burnt sugar: they are, however, of rare occurrence.

Cocoa is largely adulterated with sugar, arrow-root, and other starchy matters, with the view of concealing the cocoa-fat and enabling the powder to mix easily with boiling water.

Butter is extensively adulterated. Occasionally indeed, we have materials sold as butter which contain no butter at all. Such articles consist principally of different kinds of grease, which have been manipulated by means of salt and milk, so as to constitute a wonderfully close imitation of the genuine article. The stuff known under the misleading title of butterine is made by melting butcher fat, removing the top layer, and then mixing that with oil. When this mixture has been washed in milk and properly salted, the butterine is made. The presence of fat in butter may be detected, in many instances, by ascertaining the exact temperature at which the suspected material will melt. Genuine butter melts at from 94° to 97° F. A lower melting-point than this indicates butterine, and a higher melting-point suggests the probable presence of lard or dripping, or of some similar animal fat.

Sugar is usually sold in a state of great purity: but it does occasionally contain a slight excess of water or mineral matter. Sugar should not have a damp appearance; it should have a pure sweet taste, it should dissolve completely in cold water, and it should leave only a very small residue or ash when it is burned.

Tea was formerly much more extensively adulterated than it is at present. The only form of adulteration which we encounter in these days is in the so-called faced tea. There is nothing more than black tea, possibly not of a very high class, to which a fictitious appearance has been communicated by means of such things as indigo, Prussian blue, French chalk, plumbago, and lime being made to adhere to the surface of the leaf. This certainly is not a very serious form of adulteration, and it is very rapidly decreasing. When tea is heavily faced, the facing material may be detected by removing a portion of it either by friction on a soft piece of white cloth, or by digesting the leaves for a few minutes in a small quantity of warm water.

Oatmeal.—The only adulteration of oatmeal is barley-flour, added, it is said, for the purpose of giving the oatmeal a whiter appearance to make, indeed, the meal produced from damaged or poor oats look as if it had been made from grain of a better quality. The presence of barley or any other similar substance in oatmeal is ascertained by means of the microscope. The starch granules of barley are large and somewhat oval; those of oats are smaller and angular.

Whisky is generally supposed to be extensively adulterated. This, however, is a mistaken belief. It is frequently sold when it is too new and not properly matured, and it is occasionally rather freely watered by some of the smaller retailers. Any other form of adulteration is, however, extremely rare. The strength can be ascertained by means of the hydrometer.

Brandy is a preparation resulting from the distillation of wine. There can be little doubt, however, that most of the brandy made in this country

is simply a mixture of spirit with various flavouring materials, including, possibly, a small quantity of genuine brandy.

Wine.—The stronger wines, before they are imported, are generally 'fortified' by the addition of a certain amount of spirit. It is also alleged that wines are frequently coloured with various colouring matters. While this may be true of some of the very low-priced wines, it seems that, on the whole, wine for which a fair price has been paid, and which has been obtained at a respectable establishment, is fairly pure. A satisfactory test of the purity and quality of wine, and of similar spirituous liquors, cannot be made without employing somewhat complicated chemical processes.

Malt Liquors.—These vary in strength very considerably, from Scotch ale containing nearly 9 per cent. of alcohol, to table beer containing sometimes as little as 2 per cent. Now that the use of other bitter principles than that derived from hops has been legalised, only such bitter substances as are deleterious can be regarded as adulterations. Picric acid is certainly a poison, and it has been detected in beer. Picrotoxin, the poisonous principle of *Cocculus indicus*, is another objectionable bitter substance, the presence of which in beer has been at least strongly suspected. It is supposed that other bitter substances, such as those existing in wormwood, in aloes, in gentian, and in quassia, are occasionally used in the manufacture of beer. These, however, if they are employed at all, are made use of very seldom. It was alleged on one occasion that large quantities of strychnine were habitually used by English brewers in the production of their famous bitter beer. This absurd statement was conclusively shown to be utterly destitute of foundation. The addition of undue quantities of salt to beer is an offence for which several persons have been prosecuted. The object of adulterating beer with salt is not very apparent, unless it is done with the intention of creating thirst. Salicylic acid has also occasionally been found in beer. The salicylic acid is a powerful preservative agent, and it is added with the view of conferring special keeping properties upon the beer. Sulphuric acid, sulphate of iron, and alum were at one time added to beer or porter by the London publicans, for the purpose of giving the liquor a 'smack of age,' and producing a head. This offence seems now to be of rare occurrence. The substances used, therefore, for adulterating beer are neither very numerous nor very deleterious, and it should be added that malt liquors, although often of poor quality and badly made, are, as a rule, very free from what is rightly known as adulteration.

Honey.—Much of the material sold as honey is really not honey at all. It is composed largely of starch—sugar or glucose, and contains a small quantity of real honey in order to communicate a little of the true flavour. The raw material from which this spurious mixture is made, is prepared by acting on potato starch with oil of vitriol. The result of this action is then mixed with a small proportion of real honey; it is then packed in neat jars and sent into the market. Unfortunately, there is no simple reliable test which can be applied by people outside of a chemical laboratory to detect this fraud, so skillfully are the materials chosen and the mixture made.

Pickles are now sold in a much purer condition than formerly. At one time it was apparently thought necessary that certain varieties of pickles should always possess a bright green colour. As the vegetables themselves did not exhibit this in a degree sufficiently pronounced, the requisite tint was produced by the agency of

verdigris or of some other salt of copper. When such an adulteration as this does exist to any considerable extent, it may be detected by introducing the blade of a steel knife, which has been recently polished by means of fine sand-paper, into the vinegar in which the pickles are preserved. The presence of copper will be proclaimed by the appearance of a coating of metallic copper on the part of the knife immersed, after that has stood in contact with the liquid for a few minutes.

Mustard is at present adulterated to an enormous extent; indeed, it is only by the exercise of care that pure mustard can be obtained. The materials which are principally used for adulterating mustard are flour and the yellow dye-stuff, turmeric. It is alleged, on good authority, that cayenne pepper, ginger, and charlock are also employed; these, however, are not nearly in such common use. As in the case of honey, no simple test can be given by which the adulterations may, with certainty, be detected. The professional analyst employs for this purpose certain re-agents, which he adds to the mustard when it is arranged for observation under the microscope.

Pepper is frequently mixed with sand, occasionally with linseed-meal and other vegetable substances, and sometimes with starchy matters, such as wheat-flour, rice flour, sago, &c. The most common adulteration, the sand, may be detected by burning the suspected pepper until all the vegetable matter is consumed, and making an examination of the ash. If sand is present, the ash will be rough and gritty; whereas if the pepper is pure, the ash will be fine, and few or no rough siliceous particles will be discernible in it.

Vinegar.—The substances employed for the adulteration of vinegar are few in number. The chief of them are water and sulphuric acid. It is stated that such things as chillies and grains of paradise are occasionally made use of for the same purpose. Adulteration by water is best detected by estimating the amount of real vinegar acid which is present. This, however, can only be done by means of a properly conducted chemical analysis. A rough test, however, may be made by means of the hydrometer. According to Hassall, vinegar which shows less than 1015 on the hydrometer scale is unquestionably adulterated with water. Sulphuric acid and other mineral acids may be detected by adding to the suspected vinegar a few drops of methyl aniline violet. If the vinegar be pure, no colour will result; but if it be mixed with sulphuric or any similar acid, a blue or green coloration will be developed.

Drugs. Food adulteration, as of most interest and importance to the community generally, has been somewhat fully treated; in the other two main groups, drugs and miscellaneous articles used in the arts and manufactures, lists of the chief substances adulterated and of the most usual adulterants must here suffice; fuller information will be found under the articles on these various substances.

DRUGS.	ADULTERATING SUBSTANCE.
Aconite	Exhausted or false
Animal charcoal	Wood charcoal, and other matters.
Asafetida	Magnesian lime-stone.
Bismuth subnitrate	Calcium phosphate.
Cape aloes	Ship's biscuit and other matters.
Cassia bark	Other barks.
Castor-oil	Olive and lard oils.
Citrate of magnesia	Sodium tartaric acid.
Gregory's mixture	Lactosum carbonate.
Iodine	Phosphorus and sulphide of antimony.
Isosaccharine	Potato-starch.
Lactone	Sand and starch.
Nympha	Narcotics gums and resins.
Oil of bay rum	Oil of clove and oil of pimento.
Oil of cedar	Tallow.
Oil of lavender	Oil of spike.
Peru balsam	Rosin, benzoin, and castor-oil.

DRUGS.	ADULTERATING SUBSTANCE.
Powdered rhubarb	Starch and turmeric.
Quinine and quinine sulphate	China-quinine sulphate, salicine, and fluely picked cotton.
Salicylic acid	Acid sulphate of potash.
Sarsaparilla	Beet-root, serpentaria, podophyllum.
Scammony	Starch and chalk.
Soap	Sand, sulphate of baryta, starch, &c.
Spruce gum	Resin.
Storax	Sawdust.
Volatile oils (such as essential oil of bergamot)	Fixed oils, chloroform, alcohol, &c.

Miscellaneous Articles

Bees	Mineral matters (gypsum, sulphate of baryta, and yellow ochre), starch, resinous bodies, and paraffin.
Calicoes	Size, China clay.
Cement	Sand.
Cochineal	White-lead or tale.
Colours and dyes	Cheaper colours and diluents.
Gum and other matters	Sand, oxide of iron, ochre, &c.
India-rubber	Rubber substitute, &c.
Isinglass	Gelatine.
Linen	Cotton.
Oil	Cheaper varieties.
Paper	China clay, &c.
Seeds	Inferior and cheaper seeds.
Suult	Carbonate of soda, and moisture.
Tobacco	Nitric, glycerine, and moisture.
White-lead	Sulphate of baryta, and chalk.
Woolen cloth	Cotton fibre, shoddy.

Adultery means illicit intercourse had by a married person. In some older systems of law, as Jewish, Roman, and Greek, a distinction was taken between such intercourse with a married and with an unmarried woman. At Rome, the latter act was called *stuprum*. But this distinction has been generally abandoned in modern times. Under the canon law, which considered marriage as indissoluble, separation was granted to either spouse for adultery. Since the Reformation, in Protestant countries, adultery has been generally recognised as a ground for complete divorce, at the instance of either husband or wife. In Scotland, this is generally referred to a statute in 1567, but it was previously announced as the common law. In England, divorce could be obtained only through private statute until 1858, when the present law was established which makes a distinction between the sinning husband and the sinning wife. The wife's adultery is sufficient to procure the divorce for the husband; but to free the wife, the husband's adultery must be shown to be complicated with incest, bigamy, gross cruelty, or two years' desertion. In Scotland, adultery or wilful desertion by the husband will free the wife. Adultery was a crime severely punishable by the Jewish and the Roman law, and many modern systems of law, but it is doubtful how far these laws were executed. At Rome, they completely broke down. In Scotland, capital punishment was inflicted in remote times, but now only ecclesiastical censure. Adultery in the case of clergy leads to deprivation of office. In both England and Scotland, damages may be claimed by the injured husband from the paramour, and this was the case in England even before 1858, when the Divorce Court was introduced. In England, adulterers are allowed to marry, after the marriage has been dissolved at the instance of the innocent spouse. In Scotland, however, a statute passed in 1600, which is still in force, forbids this. See **DIVORCE, JUDICIAL SEPARATION.**

In the United States, adultery is a civil injury, for which the husband of the woman can have an action of damages against her paramour. Adultery is also a crime, punishable by fine and imprisonment, with more or less severity throughout the United States.

Ad Valorem (Lat., 'according to value'), a phrase used in levying customs duties, when the duties on the goods are fixed, not according to weight, size, or number, but at rates proportioned to the estimated value of the goods.

Advancement is properly an English law term which is applied to the advancing of money to a minor for some such purpose as setting him up in business. Settlements very often give a power to trustees to do this. In the case of intestate succession, such advances are always reckoned in distributing the estate equally among the children: in England under the Statute of Distributions, and in Scotland by the common or civil law of collation applied to legitim. But sums paid for alimony, education, or apprenticeship are not considered advances in the sense of this rule.

Advent (Lat. *adventus*, 'the coming'), a season of preparation for the festival of Christmas, as Lent for that of Easter. In the Greek Church, the Advent period comprises forty days; and similarly, in the earliest authentic notice of Advent, a canon of the Council of Mâcon (581 A.D.), fasting three times a week is enjoined from the feast of St Martin (11th November) to the Nativity. In England, this forty days' fast was observed even after Bede's death (735), though Gregory the Great (590-604) had restricted the season to the four Sundays of Advent, now observed in the Roman communion and the Church of England. It was common from an early period to speak of the coming of Christ as *fourfold*: his 'first coming in the flesh'; his coming at the hour of death to receive his faithful followers; his coming at the fall of Jerusalem; and at the day of judgment. The Gospels for the four Sundays were chosen to illustrate this fourfold view of Advent. The Advent season is intended to accord in spirit with the object celebrated. As Christians were called upon to prepare for the second personal coming of Christ, so they are exhorted, during this season, to look for a spiritual advent of Christ. The time of the year when the shortening days are hastening toward the solstice—which almost coincides with the festival of the Nativity—is thought to harmonise with the strain of sentiment proper during Advent. In opposition, possibly, to heathen festivals observed by ancient Romans and Germans, which took place at the same season, the Catholic Church ordained that the four weeks of Advent should be kept as a time of penitence; according to the words of Christ: 'Repent, for the kingdom of heaven is at hand.' During these weeks, therefore, public amusements, marriage festivities, and dancing were prohibited; fasts were enjoined, and sombre vestments were used in religious ceremonies. It was perhaps a natural thought to begin the ecclesiastical year with the days of preparation for the coming of Christ. This practice was introduced into the Western churches in the 6th century.

Adventists, SECOND, an American religious sect, who look for the speedy second coming of Christ, and the commencement of the millennium. They were originally followers of William Miller (1781-1849), and first expected the end of the world in October 1842, but have since repeatedly changed the date. Despite these mistakes, their numbers have steadily increased, and in 1880 amounted to 70,000 members, with 600 ministers. Branches of the sect hold varying views on the subjects of the divinity of Christ, and the annihilation of the wicked.—The 'Seventh-day' Adventists set no time for the coming of Christ. In 1880 they numbered 15,570, with 144 ministers. Alcohol and tobacco are generally forbidden, and abstinence from pork, tea, and coffee is recommended by this body.

Advertising is usually effected by means of the ordinary newspapers, covers and fly-leaves of magazines, or of newspapers and publications specially devoted to the purpose. Advertisements, both printed and written, are still posted on church-

doors and other places of public resort, in which case they are commonly called bills or placards. The most formal kind of advertisement, and that which is employed in the case of royal proclamations and the like, is publication in the *Gazette* (q.v.); but so little is the *Gazette* read by private persons, that publication in it alone is not a sufficient notice of a dissolution of partnership to free the partners from debts afterwards contracted in name of the company. Public notifications are frequently enjoined by statute; as, for example, under Road and Bridge Acts, the Bankrupt Statutes, &c., and in certain actions—e.g. for the distribution of a succession, or where an entailed estate is being dealt with, the court orders advertisement. It is in England a criminal offence to advertise for stolen property, promising not to make inquiries, or to repay the money advanced by pawnbrokers. Persons advertising a reward for the return of any property stolen or lost, and adding words to the effect that if returned no questions will be asked, are liable to a penalty of £50. The same applies to the printer and publisher of such advertisement. Advertisements by public carriers, railway companies, and the like, are equivalent to offers whereby the advertiser will be bound to those who send goods on the faith and in accordance with the terms of the advertisement. By advertising a *General Ship* (q.v.) for a particular voyage, the master places himself on the footing of a public carrier, and is bound to receive goods for the port to which the vessel is advertised to sail. A merchant in such circumstances can insist on his goods being received, unless the ship be full, or the entire freight engaged. The contract of affreightment is completed by the advertisement, and the shipping of the goods in conformity and with reference thereto (see CHARTER-PARTY, CARRIER).—A duty on advertisements was first enacted in 1712, and in 1853 it was wholly repealed. In 1833 it was reduced, the duty in 1832 being £170,650; in 1841 it was £131,608; and in 1853, the year of the repeal, it had increased to £180,000, thus exceeding the amount before the period of reduction.

Advertisements were not unknown in ancient Greece and Rome. The ruins of Pompeii and Herculaneum afford examples, the walls in the most frequented parts being covered with notices, painted in black and red. Announcements of plays and gladiatorial shows are common; and so are those of salt-water and fresh-water baths. In still earlier times, especially amongst the Greeks, a common medium of advertisement was the public crier; another, in cases of things stolen or strayed, or of injuries inflicted upon the advertiser, was an inscription affixed to the statues of the infernal deities, invoking curses upon the offender. In mediæval times, it appears that the advertising shopkeeper's chief organ was the public crier; and it was also customary for most traders to have touters at their doors. One of the very first posters ever printed in England was that by which Caxton announced, circa 1480, the sale of the 'Pyx of Salisbury use,' at the Red Pole, in the Almonry, Westminster. The *pyx* or *pica* was a table or directory of devotional services.

The early newspapers of the 17th century were slow to admit advertisements; and the first regular advertisers were booksellers, followed by dealers in quack medicines, and merchants. Books and pamphlets were advertised in 1647-48, and the *Mercurius Politicus* for November 22, 1660, had a quack advertisement which might have appeared at the present time. The *Public Advertiser* (1657) consisted almost wholly of advertisements, including the arrivals and departures of ships, and books to be printed. Soon other papers commenced to

insert more and more advertisements; and by the year 1682 newspaper advertising was well developed, chiefly through the medium of the *London Gazette*, the only paper that still exists of all those started about the middle of the 17th century. In 1785 was established the *Daily Universal Register*, which, in 1788, changed its name to the *Times*. Its establishment marks the beginning of the era of modern advertising.

It is well known that most newspapers and periodicals derive the bulk of their income from their advertisements; and when we remember that there are upwards of 2000 newspapers and 1300 magazines issued in the United Kingdom, the enormous development of advertising may be imagined. In London, the *Times* and *Telegraph* absorb the lion's share of the advertisers' money. In the case of the *Times*, the receipts in the advertisement department are said to be about £1000 a day. When a stamp-duty was enforced on advertisements, the *Times* paid government, in 1830, the sum of £70,000; calculated on its present sale and advertisements, the sum would now be no less than £450,000.

Advertising is now an art, and great ingenuity and activity are shown in catching the eye of the public. In many places, the finest scenery, rocks, and islands are not held sacred by the ubiquitous advertiser. Unfortunately, advertising is frequently used by unscrupulous persons to puff their wares beyond their desert, and otherwise to mislead the public. The aid of painters, poets, and essayists is called in to make the advertisements attractive; and posters have been designed by Marks and Herkomer. Messrs Pears, who have advertised their soap since the beginning of this century, spend between £30,000 and £40,000 a year in this way. Thomas Holloway, who began to advertise his pills and ointment in 1837, ultimately devoted £1000 a week to advertisements.

American advertising, which now is carried to an enormous extent, began in a humble way about 1788. A great impulse was given to it by the establishment of the *New York Sun* in 1833, the *Herald* in 1835, and the *Tribune* in 1841. To spend £20,000 a year in advertising is now no uncommon thing with many business houses; some patent medicine dealers spend even £50,000. The proprietors of a quack medicine offered a subscription of £5000 towards the gigantic statue of Liberty in New York harbour, provided they were allowed to affix an advertisement upon it for one year. See **NEWSPAPERS**; also Grant's *Newspaper Press* (1871); Sampson's *History of Advertising* (1874); and Hatton's *Journalistic London* (1882), besides the newspaper press directories.

Advice. See **BILL OF EXCHANGE**.

Advocate (Lat. *advocatus*). An advocate is generally defined 'the patron of a cause,' though it does not appear that the 'patrons' who, in ancient Rome, assisted their clients with advice and pleaded their causes were ever called by this name. Even in the time of Cicero, the term *advocatus* was not applied to a pleader or orator who pleaded in public, but rather, in strict accordance with the etymology of the word, to any one who in any piece of business was called in to assist another. There can be no doubt, however, that the forensic orators and jurists of the later period of the republic received fees (*honoraria*) for their services, and occupied a position closely analogous to that of the advocate of modern times. The occupations of a juriconsult and a forensic orator seem to have differed pretty much as those of a consulting and a practising counsel do with us. They might be exercised

separately, but were generally combined. The office of the advocate or barrister who conducted the cause in public, was, in Rome, altogether distinct from that of the procurator, or attorney, or agent, who represented the client in the litigation, and furnished the advocate with information regarding the facts of the case. The distinction between these two occupations does not everywhere prevail; and in many of the states of Germany, in Geneva, in America, and in some British colonies, as, for example, in Canada, they are united in the same person, and there is a movement in Great Britain in this direction. The common arrangement is that a firm undertakes all legal business, and one partner does forensic, another conveyancing, business. The view on one side is that a qualified practitioner should be entitled to charge for his services, and to recover payment of accounts; on the other side, that the public interest requires a bar placed by custom and honourable feeling beyond the ordinary temptations of business. In England and Ireland, advocates are called Barristers (q.v.). In England the name advocate was confined to those formerly admitted by the archbishop to practise in the Court of Arches, and who formed a separate legal college. This was changed in 1857, and barristers now practise in the ecclesiastical courts. In Scotland, as in France, the more ancient name has been retained (see **ADVOCATES**). The advocates who practise under that name in the town and county of Aberdeen are, however, not advocates in this sense, but solicitors. In France, the *avocat* and *avocat* correspond very nearly to the barrister and solicitor in England.

In the United States, advocate, if used in a legal sense, is almost synonymous with counsellor. But there is in America no such distinction between the counsellor and solicitor as exists in Britain between barrister or advocate and solicitor.

Advocate, Lord. The Lord Advocate for Scotland, called also the King's or Queen's Advocate, is the public prosecutor of crimes, senior counsel for the crown in civil causes, and a political functionary of very great importance in the management of Scottish affairs. He may issue warrants for arrest and imprisonment in any part of Scotland, and possesses many other discretionary and indefinite powers. Previous to the Union, the King's Advocate had a seat in the parliament of Scotland *ex officio*; and since that event, he has been almost invariably a member of parliament. He is appointed by the crown, and his tenure of office ceases with that of the administration of which he is a member. As first law-officer of the crown for Scotland, the Lord Advocate, when in parliament, was, prior to the creation of a Secretary for Scotland in 1885, expected to answer all questions relating to the business of Scotland, and to take the superintendence of legislation for that portion of the United Kingdom, and he still largely performs these duties, especially when the Secretary for Scotland is in the House of Lords. Notwithstanding his multifarious official duties, the Lord Advocate accepts ordinary practice at the bar, and, indeed, is usually the most extensively employed practitioner connected with the party in power. He is assisted in the duties of public prosecutor by the Solicitor-general, and by four advocates, called advocates-depute, appointed by himself. His present salary is £2388, and he is entitled to perquisites which raise his emoluments greatly above that sum. The Crown-agent, who is a Writer to the Signet (q.v.), performs in reference to crown causes pretty much the same duties that fall to a solicitor or agent in ordinary litigation. As to the relation in which the Lord Advocate stands to the public prosecutors of

crimes in the inferior courts, see *PROCURATOR-FISCAL*.

The Lord Advocate and Solicitor-general are alone entitled to plead within the bar, and they have the distinction of silk gowns like other Queen's Counsel. When the Lord Advocate declines to prosecute, it is competent for a private party to do so; but in this case the concurrence or 'concourse' of the Lord Advocate must be obtained. Such a proceeding, however, is scarcely known in the practice in Scotland. In England, the sovereign pursues in his own name; and such was the practice in Scotland also till about 1480, when the King's Advocate was appointed by James III. For some time after the institution of the College of Justice in 1532, the advocate for the crown was always one of the judges of the Court of Session, and as in France the king's advocates were also at the same time judges. It is not certain that the King's Advocate was originally authorised to act as public prosecutor in crimes; but he certainly possessed that power in 1587, and it seems to be implied in an earlier statute of 1579. The King's Advocate is first mentioned as *Lord Advocate* in the record of the Court of Justiciary in 1598. He soon became one of the most powerful members of the Scots Privy Council, and after the Union, when Walpole suppressed the separate Secretary for Scotland, the Advocate was sometimes almost supreme in Scotland. In 1804 the Lord Advocate described himself as Coroner's Inquest, Grand Jury, and Lord Lieutenant for Scotland. Mr Canning, however, transferred Scottish affairs to the Home Office. The Lord Advocate, though *not ex officio* a privy-councillor, is, by courtesy, addressed as the Right Honourable during his tenure of office. The political importance of the office has always varied with the character and capacity of its occupant for the time. See G. W. T. Omond's *The Lord Advocates of Scotland* (2 vols. 1883).

Advocates, FACULTY OF, in Scotland. The constitution of this body, like the name by which its members are known, was unquestionably derived from France. The profession seems to have existed in Scotland from a very early time; and in 1424 a statute was passed for securing the assistance of advocates to the poor. This institution has remained with little alteration to the present time (see *POOR'S ROLL*). But though existing as a profession, the advocates of Scotland did not form a faculty or society till the institution of the College of Justice (q.v.) in 1532. At first, their number was limited to ten, but there is now no limit. The number on the rolls of the body is about 370; but the number of those who practise does not exceed 120. Even of these a very small fraction live by the practice of the profession. From the improvements which have been made in the sheriff-courts, and from other causes, the amount of litigation in the Court of Session has greatly diminished since the beginning of the present century, and the continued accession of new members to the Faculty of Advocates is to be accounted for only by the fact that the bar is still regarded as the regular avenue to public and official life in Scotland. The Faculty was at one time a highly aristocratic institution, but now it is recruited from all classes of society. The Scottish advocates have always taken a liberal view of improvements in the law and legal institutions; and the chief reforms in these directions are due to their initiation or support. Two examinations are imposed on candidates for admission, the one in general scholarship, the other in law; the first, however, being dispensed with if the intrant is Master of Arts of a British university, or has a satisfactory degree of a foreign university. Other-

wise an examination takes place before a committee of the Faculty on: (1) Latin; (2) Greek, or two modern languages—French, German, Italian, Spanish; (3) Ethics and Metaphysics; (4) Logic, or Mathematics. After the expiry of a year, the qualified intrant may go in for his private examination on law. The examiners, however, cannot take him on trial if during the year he has been engaged in any trade, business, or profession. Proof of attendance on the law-classes in the university of Edinburgh is also requisite. An advocate is entitled to plead in every court in Scotland, civil, ecclesiastical, or criminal, superior or inferior; and also before the House of Lords. A party may manage his own cause in the Court of Session (q.v.), so far as oral pleading is concerned, but with exception of defences, every paper in process must be signed by an advocate. There is a widows' fund belonging to the body, which is also regulated by statute. The supreme judges of Scotland and principal sheriffs are always, and the sheriff-substitutes generally, selected from the bar. The fees on admission to the Faculty of Advocates are about £330, the great bulk of which is devoted to the purposes of the Advocates' Library. The Faculty elect from time to time a distinguished advocate as Dean of Faculty, who claims precedence at the bar over the law-officers of Scotland.

Advocates' Library. This library, which belongs to the Faculty of Advocates in Edinburgh, was established by Sir George Mackenzie of Roseburgh, the then Dean of Faculty, in 1682, in a house leased for the purpose. In 1684 the first librarian was appointed, his salary in 1686 being fixed at 400 marks per annum. In 1700 the collection narrowly escaped destruction by fire, after which it was removed from the Parliament Close to the ground floor of the Parliament House, which it still occupies. By the first Copyright Act passed in 1709, the privilege of receiving a copy of every book entered at Stationers' Hall was conferred on the Advocates' Library along with eight (afterwards ten) other libraries, four of which were attached to the Scottish universities. The four university libraries surrendered or were deprived of their privilege in 1836, receiving compensation. The privilege is still retained by the Advocates' Library. The number of volumes in the library in 1692 was 3140; in 1887 it was computed at about 305,000. The MSS. number some 3000 volumes, and relate principally to the civil and ecclesiastical history of Scotland, to genealogy and heraldry, together with poetry, bibles, prayer-books, liturgies, and copies of the Latin and Greek classics. Catalogues of the library have been compiled and printed from time to time; that begun in 1853 and finished in 1879 is a complete list of all printed books in the library at the end of 1871.

Although the library belongs strictly to the Faculty of Advocates, it is open, without introduction, to all engaged in literary work; and the administration is so liberal that it is for all practical purposes the Public Library of Scotland. The management is by a Keeper and staff of assistants, working under a board of six curators. Of those who have held the office of keeper of the library, mention may be made of Thomas Ruddiman, David Hume, Adam Ferguson, and Samuel Halkett.

Advocation was the name formerly given to the process of appeal from a Sheriff Court in Scotland to the Court of Session. It was abolished in 1868. See *APPEAL*.

Advocatus Diaboli ('the devil's advocate'), the name given to the person appointed to state the objections to any proposed canonisation in

the Romish Church. An examination of the past life of the candidate takes place, and in this process the accuser, or *advocatus diaboli*, brings forward all possible objections; while, on the other side, the *advocatus Dei* ('God's advocate') undertakes the defence. Hence the term is often applied to any person who brings forward malicious accusations. See CANONIZATION.

Advowson, the right of presentation to a church or ecclesiastical benefice in England. Advowsons are either *appendant* or *in gross*. Lords of manors were originally the founders, and, of course, the patrons of churches; and so long as a right of patronage continues annexed or appended to the manor, it is called an *advowson appendant*. Such rights are conveyed with the manor as incident thereto, by a grant of the manor only, without adding any other words. But where the advowson has been once separated from the manor, it is called an *advowson in gross*, or at large, and is annexed to the person of its owner, and not to his manor or lands.

Advowsons are of three kinds--(1) Collative, where the bishop is patron. When this is the case, rights of patronage are seldom grossly abused; though clergymen complain that the bishops are accustomed to appoint their own relatives and dependents, without due regard to the principle of promotion by merit. (2) Donative, where a private patron disposes of the living without presenting his nominee to the bishop. This form of patronage is generally condemned; but the number of donatives is small, there are probably not more than one hundred in England. (3) Presentative, where the patron presents to the bishop, who may refuse to institute a person whom he has good--i.e. legally sufficient--reason to regard as unfit, in point of learning, doctrine, or morals. If the patron is a Jew, he cannot present, and his right lapses to the Archbishop of Canterbury. If the patron is a Roman Catholic, his right lapses to the university of Oxford or of Cambridge, according to the county in which the living is situated.

An advowson is regarded as real estate, and may be disposed of as freely as other rights of property, subject to the rules of law relating to simoniacal contracts. An agreement to sell an advowson or next presentation while the living is vacant is simoniacal, and therefore unlawful. By an act of 1713, clergymen are forbidden to buy next presentations for themselves; but it has been held that the act does not apply to the purchase of a life estate in the advowson. The traffic in livings is conducted as a regular branch of agency business. It often happens that a clergyman, who owns the advowson of his living, offers it for sale, 'with immediate possession'--in other words, he agrees to resign as soon as the sale is complete, that the purchaser may present himself or the person for whom he has purchased the living; and bishops acquiesce in these illegal transactions, because they see that no good will be done by compelling the vendor to remain in charge of the parish. Scandal is also caused by the advertisement put forth by the 'clerical agents' who have livings for sale. By way of inducement to purchasers, they state that 'there is a good trout stream in the neighbourhood' 'there are no charities to support'--'the weekly attendance in church is very small'--'there is no house, and consequently no obligation to reside in the parish.' If the incumbent remains in possession, it is explained that he is extremely old, and in feeble health. Sometimes the living is offered at an enhanced value, because the church or the parsonage has been improved by means of a public subscription, or of a grant from Queen Anne's Bounty.

The abuses connected with the traffic in livings

have led to many parliamentary debates and inquiries. In 1879 a royal commission sat to take evidence on the subject; and in 1886 the Archbishop of Canterbury introduced a reforming bill into the House of Lords. Those churchmen who favour reform have generally disclaimed hostility to private patronage as an institution. They believe that patronage, when properly exercised, tends to bring a wholesome lay influence to bear on the clergy; they prefer that patronage should be in private and not in episcopal hands; and they are opposed to popular election, which, they say, works badly in the few parishes where the minister is chosen by the ratepayers. They are also well aware that parliament is not easily persuaded to meddle with rights which have been acquired by the payment of hard cash. But they desire to confer on the parishioners the right of raising objections to an unfit presentee, and on the bishop the right of refusing institution on any ground which implies unfitness for pastoral duty. The bill of 1886 proposed to provide for the appointment of a diocesan council, empowered to prevent the improper exercise of the rights of patrons. Advocates of religious equality have sometimes opposed legislation of this nature, because they hold that the church reformers are claiming powers of self-government inconsistent with the position of a state church.

Adytum, the sanctuary or innermost part of an ancient temple, which none but priests could enter, and from which oracles were delivered.

Ediles, Roman magistrates, who had the care of public buildings (*ediles*), especially the temples, and also attended to the cleansing and repairing of the streets, the preparations for funerals, public games and spectacles, the inspection of weights and measures, the regulation of markets, &c. At first there were only two ediles, who were chosen from the plebeians, and styled *Ediles plebis*; afterwards two others, styled *Ediles curules*, were chosen from the patricians (366 B.C.), and Julius Caesar appointed a new order of *Ediles cærales* to take charge of the public granaries.

Edul, one of the most powerful tribes in Gaul at the time of Caesar's arrival (58 B.C.), whose territory lay between the rivers Liger (*Loire*) and Arar (*Saône*). They formed an alliance with Caesar, who freed them from the yoke of Ariovistus, but they joined the rest of the Gauls under Vercingetorix in the great and final struggle for independence, which was fought round the little hill-town of Alesia. After his victory, Caesar treated them leniently for the sake of their old alliance. Their principal town was Bibracte.

Egean Sea, the old name of the gulf between Asia Minor and Greece, now usually called Archipelago (q.v.).

Egeus, a king of Athens, son of Pandion, and father of Theseus. When the latter sailed to Crete on his venturesome expedition to deliver Athens from the intolerable burden of the tribute due to the Minotaur, he promised his father to hoist white sails on his return as a signal of safety. But the hero forgot his promise in the joy of triumph; and his father, who was anxiously watching for the sign of victory, seeing only the black sails of his son's ship as it approached the coast of Attica, believed that he had perished, and flung himself into the sea, which from him was named the Egean.

Ægina, a Greek island about 40 sq. m. in area, in the Gulf of Ægina (the ancient *Saronicus Sinus*). It is mountainous, with deep valleys and chasms. The modern town of Ægina stands on the site of the ancient town, at the NW. end of the island. There are considerable remains still

left of the ancient city, and the ruins of solidly built walls and harbour moles still attest its size and importance. The island contains about 6000 inhabitants. The most ancient name of the island was *Enone*, and the *Myrmidons* dwelt in its valleys and caverns. For a century before the Persian war it was a prosperous state; during this period it was also the chief seat of Greek art. Its sailors covered themselves with glory at Salamis. The Athenians in 429 B.C. expelled the original inhabitants, whose language and style of art were Dorian.

ÆGINETAN SCULPTURES.—Egina holds an important position in the history of Greek art. On an eminence in the eastern part of the island stand the ruins of a temple of Pallas Athene. Among the ruins a series of statues were excavated in 1811, which are now the most remarkable ornaments of the Glyptothek at Munich. One group represents a combat of Greeks and Trojans for the body of Achilles. The figures are true to nature, with the structure of bones, muscles, and even veins, distinctly marked; but there is no individuality, all the faces having that uniform forced smile which is characteristic of all sculpture before the time of Phidias. Probably they date from not more than fifty years before Phidias.

Ægineta, PAULUS. See PAULUS ÆGINETA.

Ægis, the shield of Zeus, which had been fashioned by Hephaestus (Vulcan). When Zeus was angry, he waved and shook the ægis, making a sound like that of a tempest, by which the nations were overawed. It was the symbol of divine protection, and became, in course of time, the exclusive attribute of Zeus and Athene.

Ægisthus, son of Thyestes, and cousin of Agamemnon. He did not accompany the Greeks to Troy, and during the absence of Agamemnon, lived in adultery with Clytemnestra, his wife. He assisted her in murdering her husband on his return, but was himself put to death seven years later by Orestes, son of Agamemnon. This is the account given by Homer; the tragic poets make Clytemnestra alone murder Agamemnon, her motive in Æschylus being her jealousy of Cassandra; in Sophocles and Euripides, her wrath at the death of Iphigenia. Later writers also describe Ægisthus as the son of Thyestes by unwitting incest with his daughter Pelopia.

Æglé, a genus of *Aurantiaceæ* (q.v.), one of which, the *Ægle marmelos*, produces a fragrant, delicious, and wholesome Indian fruit resembling the orange, called Bael-fruit or Bhel-fruit. In an imperfectly ripened state, it is an astringent of great effect in cases of diarrhoea and dysentery. The root, bark, and leaves are of similar properties. A perfume has been prepared from the rind of the fruit, which also furnishes a yellow dye, while the seed yields a cement.

Ægospotamos (Gr., 'goat-river'), in the Thracian Chersonesus, is famous for the defeat of the Athenian fleet by the Lacedæmonians under Lysander, which put an end to the Peloponnesian war, and to the predominance of Athens in Greece, 405 B.C.

Ælfrie (called *Grammaticus*, 'the Grammarian'), a voluminous old English writer about the close of the 10th century whose history and whose personality even are alike involved in obscurity. It is known that he was a pupil of Ethelwold, most likely at the Benedictine monastery of Abingdon, and it is more than probable that he accompanied his master on his advancement to the see of Winchester. He was appointed to rule over the new monastery at Cerne, and afterwards became abbot of Ensham. He has been sometimes, as by Wright,

Dean Hook, and Mr Freeman, confounded with Ælfrie, the Archbishop of Canterbury from 995 to 1005; and by others, as Wharton and Thorpe, with Ælfrie, the Archbishop of York from 1032 to 1051. The grammatical works ascribed to Ælfrie are his Latin and English grammar and glossary, printed by Somner at Oxford in 1659, included in Professor Zupitza's *Sammlung Englischer Denkmäler* (Berlin, 1880); and his *Colloquium*, a series of dialogues containing interesting descriptions of common life, in Latin, with English interlinear translation. His most important work is his collection of *Homilies*, 80 in number, edited by Thorpe for the Ælfrie Society (1844-46). They are short and vigorous, and attracted great attention at the time of the English Reformation. The 'Paschal Homily,' as well as two or three others, has been often appealed to in controversy to prove that the doctrine of the early church in England differed in some important respects from that of the later Roman Church. Among his other works are a treatise on the Old and New Testaments, and an abridgment of the Pentateuch and the Book of Job.

Ælianus, CLAUDIUS, a native of Præneste in Italy, who studied and taught rhetoric in Rome at the end of the 2d century A.D., and was styled the 'Sophist.' Two of his works remain—the *Varia Historia*, in fourteen books (containing biographical notices, anecdotes, &c.); the other, in seventeen books, *De Natura Animalium*, on curiosities of animals and animal life.

Æmilian Provinces. See EMILIAN PROVINCES.

Æmilius Paulus. The most remarkable of this name was the son of the consul Æmilius Paulus, who fell in the battle of Cannæ, 216 B.C. Young Æmilius inherited his father's valour, and enjoyed an unwon degree of public esteem and confidence. In 168 B.C. he was elected consul for the second time, and intrusted with the war against Persens, king of Macedon, whom he defeated in the battle of Pydna.

Æne'as, the hero of Virgil's *Æneid*, was, according to Homer, the son of Anchises and Aphrodite (Venus), and ranked next to Hector among the Trojan heroes. The traditions of his adventures before and after the fall of Troy are various and discordant. Virgil gives the following version: Æne'as, though warned by Priam in the night when the Greeks entered Troy, to take his household gods and flee from the city, remained in the contest until Priam fell, when, taking with him his family, he escaped from the Greeks, carrying his aged father on his shoulders, but in the confusion of his hasty flight, lost his wife Creusa. His filial affection to his father earned him the name of the 'pious Æne'as.' Having collected a fleet of twenty vessels, he sailed to Thrace, where he began building a city, but was terrified by an unfavourable omen, and abandoned his plan of a settlement there. A mistaken interpretation of the oracle of Delphi now led him to Crete; but from this place he was driven by a pestilence. Passing the promontory of Actium, he came to Epirus, and then continued his voyage to Italy and round Sicily to the promontory of Drepanum on the west, where his father Anchises died. A storm afterwards drove him to the coast of Africa, and landing near Carthage, he was hospitably received and entertained by Queen Dido. His marriage with Dido was prevented only by an express command of Jupiter that he must return to Italy. The hero sailed away, leaving the unhappy queen to despair and death by her own hand. During his stay in Sicily, where he celebrated the funeral of his father, the wives of his companions and seamen, weary of long voyages without certainty of finding a home,

set fire to his fleet. After building the city Aeceta, he sailed for Italy, leaving behind him the women, and some of the men belonging to his fleet. On landing in Italy, he visited the Sibyl at Cumæ, and received intimations of his future destiny. Then, sailing along the Tiber, and landing on the east side of the river, he found himself in the country of Latinus, king of the Aborigines. Lavinia, the daughter of Latinus, had been destined to marry a stranger; but her mother had promised to give her in marriage to Turnus, king of the Rutuli. A war ensued, which terminated in the marriage of Æneas with Lavinia. His landing in Italy occurred seven years after the fall of Troy. Many of the episodes in the story, as his meeting with Queen Dido at Carthage, are irreconcilable even with mythical chronology. Iulus or Ascanius, son of Æneas and Crensa, was claimed as their eponymous ancestor by the Julian gens at Rome; hence constant allusions to the divine ancestress of Augustus occur in Virgil, Horace, and other poets of his time.

Æneas Silvius. See PIVS II.

Æolian Accumulations is the term often applied to formations which are due to the action of the wind, such as the sandhills or dunes of many maritime regions, and the similar hillocks which occur in desiccated areas, such as those of the Sahara, Arabia, Utah, Arizona, &c.

Æolian Harp (i.e. 'the harp of Æolus'), a simple musical instrument which produces harmonic sounds when placed in a current of wind. It is formed by stretching eight or ten catgut strings of various thickness, all tuned in unison, over a wooden shell or box, made generally in a form sloping like a desk. The sounds produced by the rising and falling wind, in passing over the strings, are of a drowsy and lulling character, so that the Æolian harp is most fitly introduced by Thomson into the *Castle of Indolence*. St Dunstan is said to have invented it; modifications were Schnell's Armonchord (1789), and Herz's Pianocölon (1851).

Æolian Islands. See LIPARI.

Æolians, one of the principal races of the Greek people, who were originally settled in Thessaly, from which they spread and formed numerous settlements in the northern parts of Greece and in the west of Peloponnesus. In the 11th century B.C., some part of them emigrated to Asia Minor, where they founded on the NW. coast in Mysia and the adjacent isles (hence called Æolia) more than thirty cities; among them Smyrna, and Mitylene in the island of Lesbos, where the Æolic dialect of the Greek language chiefly developed itself in the forms employed in the poetry of Alceus and Sappho. The Æolians shared the fate of the other Greek colonies in Asia Minor. First oppressed by the Lydian kings, then deprived of their independence by the Persians, they became a portion of the great empire founded by Alexander, and were ultimately absorbed in the Roman empire.

Æolipile, a hollow metallic ball, in which, when heated, steam issues by apertures or tubes, so as to turn the ball. It was invented by Hero of Alexandria. See HERO, STEAM-ENGINE.

Æolotropic (from Greek words for 'changeful' and 'turning') is the opposite of *isotropic*, and implies change in the electric, optical, or other physical properties of bodies in consequence of change of position—as when the refractive property of a transparent body is not the same in all directions. The æolotropic property is a notable instance. A body may not, however, be equally æolotropic in all respects; it may be isotropic in one or more qualities, and æolotropic in others. See REFRACTION, POLARISATION.

Æolus, the ruler and god of the winds, who reigned over the group of islands NE. of Sicily, named from him the Æolian Islands, now the Lipari group. The dominion over the winds was intrusted to him by Zeus, and he kept them inclosed in a cave under a mountain. He must not be confounded with his ancestor of the same name, who was ruler of Thessaly and the mythical founder of the Æolic branch of the Greek race.

Æon, a Greek word properly meaning 'age' or 'eternity,' but used by the Gnostics to mean an emanation from God, which became in some degree a separate spiritual existence, and presided over spheres of the world or phases of the world's history. See GNOSTICISM.

Epyornis (Gr., 'tall bird'), the name given to a great wingless bird, whose remains occur in Post-tertiary deposits in Madagascar. Its sub-fossil eggs are 13 to 14 inches in diameter, and have the capacity of three ostrich eggs. There appear to have been two or three species of epyornis, one of these being as large as, or larger than, the Dinornis (q.v.).

Æqui, a warlike tribe of ancient Italy who inhabited the upper valley and hills to the SE. of the river Anio, on the eastern border of Latium. Together with the Volsci, a kindred tribe, they waged constant warfare with the young Roman republic, sometimes carrying their raids to the very gates of the city. In 446 B.C. they appeared for the last time before the city, and in 418 they were dispossessed of their great stronghold on Mount Algidus. Their last struggle with Rome began in 304, and ended with their complete subjugation.

Aerated Bread is bread not fermented with yeast, but mechanically charged with carbonic acid gas, the gas being derived usually from carbonic acid water. See BREAD.

Aerated Waters is the name applied to the large class of beverages which are rendered sparkling by dissolving in them carbonic acid under pressure. The term does not include champagne or fermented ginger-beer, or any other carbonated beverage in which the carbonic acid gas is produced by the natural process of fermentation. Carbonic acid dissolves readily in water, that liquid absorbing at the ordinary atmospheric pressure and temperature about its own volume of the gas. Under pressure, however, as when the gas is forced into a strong vessel containing the water, it absorbs many times its own volume; and when the pressure is released, the extra amount of carbonic acid escapes, rendering it sparkling or effervescent. The water does not, however, give off all the extra gas at once; hence the well-known experiment of dropping a piece of cork into a tumblerful of lemonade, when immediate effervescence takes place, and carbonic acid is given off. All agitation, or the presence of particles of dust, favours the disengagement of the gas, and so it is that in drawing lemonade from a siphon (see below), the tumbler is filled with froth to an extent not noticed in pouring from a bottle. In this case, the rapidity of discharge through a narrow tube causes immediate liberation of a large volume of the gas, producing the froth referred to. The varying solubility of carbonic acid at different temperatures and pressures explains why siphons or bottles which have been kept in a cold place appear to be deficient in gas, when in reality the gas is only kept in solution by the low temperature of the water.

It would be beyond the scope of this article to describe the various forms of apparatus used in the production of the large scale of aerated water, for in no branch of industry has more ingenuity been expended than in the devising of labour-saving apparatus for aerated water. Essentially, the process consists in the production of Carbonic Acid

(q.v.) from whiting or chalk, by the action of sulphuric acid. The refuse, consisting of plaster of Paris, is thrown away, while the gas, after being purified by washing with water, is stored in a copper bell or gasometer. Thence it is pumped along with water into copper or gun metal vessels lined with pure tin, being made to dissolve in the water either by agitation or by other appliances. When the pressure inside these vessels reaches about 100 lb. per square inch, the water contains about seven times its volume of gas, and is ready to be filled into bottles. The *bottling* is accomplished with great speed, an expert bottler being able to fill from thirty to fifty dozen of corked bottles per hour; while, when patent (i.e. ball stoppered) bottles are used, from forty to seventy dozen may be fi. d. Up till comparatively recent years, only corks were used for closing the bottles; but it is computed that between 200 and 300 forms of patent bottles have been recently introduced, which all depend on the internal pressure of the gas forcing a ball of glass, wood, or other material against a rubber ring placed in the neck, and thus sealing the bottle. The *siphon* is a glass bottle, fitted with a metal top, and furnished with a lever or handle, which enables a portion of the contents to be drawn off without difficulty. The head should be of the purest tin, to avoid contamination of the aerated water. Formerly there was risk of lead-poisoning by aerated waters, as they readily dissolve lead, but all manufacturers of any repute now make it a point to use no lead-piping whatever in their machinery, pure tin-pipe being alone admissible.

The better known kinds of aerated waters are: (1) *Potash and Soda waters*, which, when of full medicinal strength, contain fifteen grains of the bicarbonate of potash or soda in each bottle; usually, however, much less is put in, and the amount ranges from one to seven or ten grains; (2) *Aerated water*, which is frequently sold for soda-water, but is a simple solution of carbonic acid, and contains no admixture; (3) *Seltzer water* (better *Selters water*, being named from Selters, in Nassau, where natural mineral water of this composition is obtained), which contains the chlorides of sodium, calcium, and magnesium, along with phosphate and sulphate of sodium; (4) *Medicinal waters*, containing varying proportions of chemicals, as, for instance, lime, carbonate of iron, citrate of lithia, or bromide of potassium.

The temperance drinks, which include such favourites as lemonade, ginger beer, ginger-ale, and tonic bitters, are all made by putting the requisite quantity of flavouring syrup into a bottle, and filling up with simple aerated water; and the varying qualities in the market correspond to the variety in the receipts from which they are made.

On the small scale, and for family use, carbonic acid water may be conveniently prepared in the apparatus known as the *gazogenic* or *seltzogene*. It usually consists of two globes, one above the other, and connected by a tube. Powders of bicarbonate of soda and tartaric acid are then placed in the upper globe, and the apparatus is inclined till water from the lower globe enters by the tube, and fills the upper globe about one-third. The tartaric acid and bicarbonate of soda have no action on each other so long as they are dry; but whenever water is admitted, the tartaric acid combines with the soda and water to form tartrate of soda and water, and at the same time carbonic acid is given off, and descending the tube into the lower globe, dissolves in the water contained therein. Occasionally, bisulphate of potash is used instead of tartaric acid, to save the greater expense of the latter. *Aerated fruit-beverages* are produced when the water charged with

carbonic acid is received in a glass containing about a table-spoonful of any of the fruit-syrups.

A well-known effervescing draught is made from *soda-powders*, composed of bicarbonate of soda and tartaric acid. *Seidlitz-powders* contain tartrate of soda and bicarbonate of soda in one paper, and tartaric acid in the other. Many waters naturally aerated have important medicinal properties; these will be discussed under the title of MINERAL WATERS.

Aerodynamics is that branch of Hydrodynamics (q.v.) which treats of air and other gases in motion.

Aeroklinoscope is the name of an instrument invented by Buys Ballot, and used in connection with weather signals for exhibiting publicly the difference of barometric pressure at different observing stations. One form is a pole 30 feet high, turning on a pivot, and having on the top a horizontal arm capable of being inclined more or less. The system of working the arm is of course settled by conventional agreement.

Aerolites (Gr. *aër*, 'air,' and *lithos*, 'stone'), a name given to stony or metallic bodies falling on the earth's surface from interplanetary space. See METEORS.

Aeronautics. See BALLOON, FLYING-MACHINE.

Aerostatic Press. This is a machine used in extracting the colouring matter from dye-woods and such like. A vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the colour is laid, and a cover, also perforated, is placed upon it. The extracting liquid is then poured on the top, and the air being drawn from the under part of the vessel by a pump, the liquid is forced through the substance by the pressure of the atmosphere.

Aerostatics is that branch of Hydrostatics (q.v.) which treats of the equilibrium and pressure, &c. of air and gases.

Æschines, an Athenian orator, second only to Demosthenes, born 389 B.C. In the question of the attitude of Athens towards King Philip of Macedon, who was then pursuing his designs for the subjugation of the several Greek states, Demosthenes advocated the policy of opposing him before it was too late, while Æschines was the head of the peace-party. He was a member of more than one embassy sent by the Athenians to Philip; and Demosthenes accused him of receiving bribes from the Macedonian monarch, and of betraying the cause of Athens and of her allies. There is no proof that this was the case; and perhaps Æschines was deceived by the wily Philip into believing that no harm was meant to the liberties of Athens, and that peace was the best policy for his countrymen. The result justified the sagacious fears of Demosthenes, and condemned the selfish, isolating policy of Æschines. When it was proposed to reward Demosthenes with a golden crown for his patriotic exertions in defence of his country, Æschines indicted the proposer, Ctesiphon, for bringing forward an illegal proposition. Demosthenes replied in perhaps the greatest of his speeches, and Æschines being vanquished, and having thus incurred the penalty attached to an unfounded accusation, was obliged to retire from Athens. He finally established a school of eloquence in Rhodes, which enjoyed a high reputation. The story is told that once he read his great oration against Ctesiphon at Rhodes, and when some of his hearers expressed their wonder at its want of success, he replied, 'You would cease to be astonished if you had heard Demosthenes.' He died at Samos, 314 B.C. The oration against

Ctesiphon and two others are the only authentic productions of Æschines that have come down to us. They are found in editions of the Attic orators, as those of Bekker. Good editions of the three speeches alone are those by Franke (Leip. 1860) and Weidner (Berl. 1872). See Jebb's *Attic Orators* (2 vols. 1876-80).

Æschylus, the son of Euphion, to us the father of Greek tragedy, was born at Eleusis, the town of the Mysteries, near Athens, in 525 B.C., and no doubt had his religious feeling stimulated by the solemn services which represented the deepest and purest elements of Greek religion. We know that he was initiated, by the fact that he was accused of divulging the divine secrets in one of his plays. The first attempts at tragedy had been made by Thespis, who is to us only a name; and there were older contemporaries of Æschylus, with whom he contended successfully, but who no doubt helped to perfect his education in poetry. He fought for Athens in the great Persian wars, and is reported to have been wounded at Marathon, where his brother fell. Pausanias tells us that in his epitaph he recalled these facts of his life, rather than his victories as a poet. The first of these latter was gained in 485 B.C., and from this time till the middle of the century he worked with all the energy and patience of a great genius at his art. He won thirteen first prizes in tragic competitions, and was exceedingly hurt at being defeated by Sophocles in 468 B.C. This may have induced him to leave Athens and go to Sicily, which he had already visited to bring out a play for the artistic tyrant Hiero. He produced there a new edition of his extant *Persæ*. His trial before the Areopagus on the charge of divulging the Mysteries is, however, also stated as a cause of his departure. His last great victory was won in 458 B.C., with the trilogy which we still possess, and three years later he died at Gela in Sicily, where his tomb was shown long after. The Athenians specially rewarded any impresario in after-days who brought out his plays afresh. There are a few fables current in addition to the above meagre facts, but they are not worth repeating here. Out of some sixty plays ascribed to him, we have only seven extant, on each of which we shall say a word.

The *Suppliants* is the earliest, at least in form (its date uncertain), for the chorus is still the principal feature, as we know it had been in the first attempts of Thespis. The plot, which is exceedingly simple, is based on the escape of the fifty daughters of Danaus from their suitors, the sons of Ægyptus, and their *supplications* to the king of Argos to protect them. There is very little character-drawing, save that of nationalities, the petulant and insolent Egyptians being contrasted with the honourable and somewhat democratic people of Argos, whither the suppliants have fled. Yet this simple subject gives the poet occasion for the loftiest utterances on Fate and Divine Providence, expressed in that tremendous diction which no other Greek poet ever equalled.

The *Persæ* is profoundly interesting, as giving us, in a tragedy, a piece of contemporary history, for the poet fought in the battle of Salamis, which he describes. But far from degrading his play into a mere panegyric of Athenian valour, the poet lays his scene far away at the Persian court, where the queen-mother Atossa is awaiting news of Xerxes' army. The ghost of Darius which appears is perhaps the most distinctive character.

The *Seven against Thebes* brings us to a more advanced stage of the poet's development. It is no longer the chorus but Eteocles, the patriotic king of the Cadmeans, who takes the leading part. The drawing of his character is clear and sharp, and Mr Verrall, in his edition of this play (1887),

has also shown with what delicate artifice the poet has brought his hero, by the insensible steps of a hideous fate, to meet his brother Polyneices in fratricidal conflict. Both the narrative of the messenger who gives the details of the fight, and the choruses uttered by terrified maidens of the city, are full of life and beauty. The bringing in of the bodies, and the lament over them, form a sort of musical conclusion to the play.

The *Prometheus Bound* is the perfection of Æschylus' art, and shows us what his genius could do in simple tragedy, in the old plotless, motionless, surpriseless drama, made up of speeches and songs and nothing more. We now have three actors together on the stage, and the duties of the chorus, once so prominent, are becoming restricted to subordinate work. Prometheus, the heroic sufferer, sustains the whole interest of the play. He is driven with insult to the Caucasus. He soliloquises. He discourses with friendly nymphs and their cautious father, Oceanus. He consoles with the frantic Io, who passes by in her wanderings: he prophesies her future. Lastly, he bids defiance to Zeus, through his messenger Hermes, sent to coerce him into further prophecy, and disappears amid thunder and whirlwind. Almost every commentator has imagined that Æschylus had some deep theory in his mind, which he desired to illustrate by the play. But whether that theory was philosophical, or moral, or scientific, or political—whether he meant to symbolise the struggles of man against nature, or against passion, or against tyranny, or against theology will never be determined.

We now come to the *Orestia*, or three plays on the fortunes of Orestes, which is the latest and greatest work we have from Æschylus. These pieces, the *Agamemnon*, *Choephori*, and *Eumenides*, are the only extant specimens of what the Greeks called a trilogy, and show us how the older tragic poets combined three plays on a single subject.

The first of the series, the *Agamemnon*, is the longest play left us by the poet, as perhaps the greatest Greek play of all that have survived. With a perfectly simple plot, there is splendid and consistent drawing of character, deep philosophy in the choral songs, and a certain gloomy grandeur which makes it unique. The central point of interest to the reader is the scene between Cassandra and the chorus, when she tries to make plain to them the horrid murder of the king, which she foresees as imminent. Agamemnon is drawn as in the *Iliad*, a great king but a weak man, while Clytemnestra is the leading spirit of the piece. Even in the collateral quality of picturesqueness, this masterpiece is above almost all its rivals.

The *Choephori*, a shorter and less striking play, but not without the same grandeur and the same gloom, gives us the return of Orestes from exile, and his murder of Clytemnestra, in accordance with both the command of the oracle and the sentiments of the Greek mind.

In the *Eumenides*, we find the necessary results of the previous tragedy. Though Orestes has obeyed one great moral law, avenging the blood of his father, he has violated another no less sacred in taking the life of his mother, whose Furies (*Eumenides*) persecute him with ceaseless pursuit.

There are a large number of short fragments preserved in quotations, but none of sufficient importance to detain us here. The genius of Æschylus is quite peculiar in Greek literature, and he has no equal. There is something oriental in his boldness, his uncouth yet expressive compounds, his daring, piled-up metaphors. But what distinguishes him still more from great contemporaries like Pindar, or great successors like Sophocles, is the grandeur of his

conceptions in theology, in the providential ruling of the world, the inheritance of sin, the conflict of rude with purer religion.

The newest critical text of all the plays is Wecklein's (Berlin, 1885). The handiest general commentary is Dr Paley's (4th ed. 1879); and we have translations by Potter, Blackie, and Plumptre. For special plays, Sidgwick's *Agamemnon*, and R. Browning's and Fitzgerald's translations of the same, Verrall's *Septem*, Prickard's *Perses*, and Mrs Browning's version of the *Prometheus*, are the best helps available to English students.

Æsculapius (Gr. *Asklēpios*) appears in Homer as the 'blameless physician,' of human origin; in the later legends, he has become the god of the healing art. The most common account makes him the son of Apollo and Coronis. He was brought up by Chiron, and instructed in the healing art, in which he soon surpassed his teacher, and succeeded so far as to restore the dead to life. Phlo, afraid that his realm would get no new inhabitants, therefore complained to Zeus, who slew the physician by a thunderbolt. After this he was raised to the rank of the gods by the gratitude of mankind, and was especially worshipped at Epidaurus, on the coast of Laconia. Here oriental elements, especially serpent-worship, seem to have been mingled with his rites and ceremonies. From Epidaurus the worship of the healing god extended itself over the whole of Greece, and even to Rome. According to Homer, Æsculapius left two sons, Machaon and Podalirius, who, as physicians, attended the Greek army. From them the race of the A-clepiades descended. Hygieia, Panacea, and Ægle are represented as his daughters. The temples of Æsculapius usually stood outside of the cities in healthy situations, on hillsides, and near fountains. Patients that were cured of their ailments offered a cock or a goat to the god, and hung up a tablet in his temple, recording the name, the disease, and the manner of cure. Many of those votive tablets are still extant. The statue of the god at Epidaurus, formed of gold and ivory by Thrasymedes, represented Æsculapius as seated on a throne, and holding in one hand a staff with a snake coiled round it, the other hand resting on the head of a snake; a dog, as emblem of watchfulness, at the foot of the deity. Praxiteles and other sculptors represented the god as an ideal of manly beauty, closely resembling Zeus; with hair thrown up from the brow, and falling in curls on each side. The upper part of the body was naked, and the lower was covered by a mantle falling in folds from the shoulders. He had sometimes a laurel wreath on his head, and a cock or owl at his feet; or was attended by a dwarf-figure named Thelesphorus.—ASCLEPIADES, the followers of Æsculapius, who inherited and kept the secrets of the healing art; or, assuming that Æsculapius was merely a divine symbol, the Asclepiades must be regarded as a medical, priestly caste who preserved as mysteries the doctrines of medicine. The members of the caste, or medical order, were bound by an oath—the *Hippocratici iuramentum*—not to divulge the secrets of their profession. Hippocrates is said to have descended from the Asclepiades of Cos who traced their descent, on the mother's side, from Hercules.

Æsir, a race of gods in the Scandinavian Mythology (q.v.).

Æsop, the famous Greek fabulist, who lived in the later half of the 6th century B.C. He is supposed to have been original! a native of Phrygia and a slave, but so have been afterwards made free. He then visited the court of Croesus, and gained his confidence to such an extent that he was sent on several missions, in one of which, to Delphi, he was thrown over a precipice by the priests, infuriated at his witty blasphemies. The traditions of his ugliness and his buffoonery may

be dismissed. We know from Aristophanes that fables bearing the name of Æsop were popular at his time, and indeed we find that his name became in Greek literature a peg on which to hang anything in this form. The fables connected with his name were long transmitted through oral tradition. Socrates turned such of them as he could remember into verse during his imprisonment, and the same was done by Demetrius Phalereus. The only Greek version, however, of which any entire fables remain, and which, as shown by Bentley, has furnished materials to subsequent collections, is that of Babrius (q.v.). Later investigations have given to these ancient fables a still more venerable antiquity, in tracing the origin of many of them to the Jatakas or Birth-stories of Buddha. See Halm's work (2d ed. Leip. 1860), and the article BEAST-FABLES.—A Roman actor of this name, CLAUDIUS ÆSOPUS, a contemporary and friend of Cicero, was as eminent in tragedy as Roscius was in comedy.

Æstheticism is an art movement which has sprung up during the present generation, manifesting itself in various forms. As its name implies, it is concerned with the beautiful; but the fantastic developments which have accompanied it, have recently tended to bring the new gospel into ridicule. Its more amusing and extravagant aspects have been happily travestied in the pages of *Punch*, and in Gilbert and Sullivan's *Patience* (1881). The fundamental principle of æstheticism is to carry a love of the beautiful into every home, and into all the relations of life. Bric-à-brac, china, ornamental daddos, and curtains of old gold, with Queen Anne furniture, or with reproductions of Greek and Roman art, have demonstrated the aspirations of the æsthete in his home. While the movement generally has led to much superficial dogmatism upon art, culture, and classicism, it has undoubtedly given an impetus to the study and appreciation of the beautiful amongst the masses. Mr Ruskin has done much to advance an understanding of the higher æstheticism by his writings, and Sir Frederick Leighton and Alma-Tadema are conspicuous amongst those who have realised its ideal in their dwellings. In art, Holman Hunt, Rossetti, Burne Jones, and others associated with the pre-Raphaelite movement, have given expression to the nobler æsthetic ideas and principles in their works. When the extravagances attending the movement have been purged away, there may still be left an educating influence, which will impress the lofty and undying principles of art upon the minds of the people.

Æsthetics is the term now commonly used to denote the science or philosophy of the Beautiful; the principles of taste and of art. *Æsthetica* was first used in this sense by the Wolfian philosopher, Baumgarten; and though Kant, keeping nearer the meaning of the original Greek word, dealt in his *Transcendental Æsthetic* with the conditions of sensuous perception, Baumgarten's usage, as being convenient, became popular, and was established in Britain about 1830.

The name of Plato is bound up with the history of speculation on the Beautiful, which he never wholly separated from the Good. His position is far from precise, but it may be said that for him the beauty of finite things arises out of their participation in the eternal and ideal archetypes which constitute the keynote of all his speculations. Aristotle is more precise than his master, and left a body of valuable and still valid canons of criticism, especially for poetry. An Aristotelian dictum is, that the beautiful is that which is neither too large nor too small, a mean between extremes.

Baumgarten above mentioned (*circa* 1750) is the father of aesthetics as a well-defined system. According to him and his followers, sense is the lower intellectual power, understanding and reason the higher. As the true and the good are apprehended by the latter, the beautiful is grasped by the former; and aesthetics is a humbler stage of the intellectual energies.

Winckelmann did much to further æsthetic criticism by his examination of the principles of Greek sculpture; Lessing still more, by his attempt to distinguish, in his *Laocoon*, the province of poetry from that of painting and sculpture, and by excluding from the legitimate sphere of plastic art the representation of the repulsive and disgusting. Schiller was not merely a great poet, but a suggestive critic; and one of his trenchant maxims was that 'the annihilation or superseding of the *matter* by the *form* is the true art-secret of the master-artist.' The influence of Goethe by means of his *Wilhelm Meister* and other works, has probably influenced the thought of Europe still more.

Kant's *Critique of Judgment* deals with the *a priori* principles of emotion, of pleasure and pain, as intermediate between knowledge and volition, the judgment being æsthetical or teleological respectively; while the beautiful is analysed with reference to the four well-known categories of his system. Fichte and Schelling both included aesthetics in their schemes of philosophy; but the work of Hegel in this department attracted much more interest, and was for a time of paramount influence in Germany. With him, the beautiful is the absolute ideal realising itself; nothing is truly beautiful except this; nothing, therefore, which exists in concrete form can be so termed. Out of the sphere of the pure reason we have only an eternal aspiration. In the finite mind, the absolute ideal is always striving to realise itself, but never completely succeeds; there is only a ceaseless approximation. Beauty, whether of nature or history, is rare, accidental, fugitive, and tarnished by intermixture with the not-beautiful. The beautiful first passes into self-recognition in the dawn of human intelligence, and its conscious realisation of itself increases in proportion to the culture of the race or the individual. The highest finite realisation of it is Art; for though the form of art be material, it is matter shaped according to an idea. The artist looks on the form simply as the objective embodiment of the idea. Form, though springing out of matter, is thus a deliverance from matter, and the particular arts may consequently be regarded as the gradual working of the mind out of materialism. The formative arts—Architecture, Sculpture, Painting—are silent, heavy, still partly material. Music is an advance on these, and breathes in a higher region; the materialism of Sound becomes all but ideal. Poetry is a further advance. It is the pathway of the intellect to pure thought.

Herbart and the Realists, including Zimmermann, directly opposed the Hegelian theory. For them, aesthetics is that branch of philosophy which deals with the forms by which any subject of thought provokes pleasure or the reverse, whether it be a representation of a reality or a pure invention of the imagination; a picture does not gain in beauty by reality, though it may gain in truth. Vischer, and Carrière, Schopenhauer and Kirchmann, Fechner and Lotze, amongst German systematists, have all copiously dealt with aesthetics.

In France, Diderot and Père Buffier propounded theories of beauty. The founder of the Eclectic School of Philosophy, Victor Cousin, eloquently expounded the Platonic view.

In Britain, the first publication on this subject of

any consequence—if we except Lord Shaftesbury's *Characteristics*, in which there is set forth a 'rapturous Platonic doctrine'—was Hutcheson's *Inquiry* (1725). In this work, the existence of an 'internal sense,' through which we either obtain a perception of the beautiful, or are made in some way conscious of its presence, was maintained.

Burke, in his famous *Treatise on the Sublime and the Beautiful* (1756), relies mainly on physiological considerations. Amongst the elements of beauty are smallness, smoothness, variety of outline, delicacy, brightness and softness of colour. 'All objects appear beautiful which have the power of producing a peculiar relaxation of our nerves and fibres.'

Sir Joshua Reynolds, borrowing from Père Buffier, treated beauty as the mean between two extremes. Hogarth's more ingenious and acute *Analysis of Beauty* emphasises fitness, variety, symmetry, intricacy with simplicity and distinctness, and size.

Alison's *Essays on the Nature and Principles of Taste* (1790) propounded the theory of Association. Jeffrey, in his famous essay, substantially adopts and expounds Alison's views. According to Jeffrey, 'these emotions (that is, those excited by the contemplation of certain objects) are not original emotions, nor produced directly by any qualities in the objects which excite them; but are reflections or images of the more radical and familiar emotions to which we have already alluded, and are occasioned not by any inherent virtue in the objects before us, but by the accidents, if we may so express ourselves, by which these may have been enabled to suggest or recall to us our own past sensations or sympathies.' He explicitly denies that there is any independent or intrinsic beauty in form.

Sir William Hamilton distinguishes beauty into Absolute and Relative. 'In the former case,' he says, 'it is not necessary to have a notion of what the object ought to be before we pronounce it beautiful or not; in the latter case, such a previous notion is required.' In the case of free or absolute beauty, 'both the imagination and the understanding find occupation; and the pleasure we experience from such an object is in proportion as it affords to these faculties the opportunity of exerting fully and freely their respective energies. The beautiful is that whose form occupies the imagination and the understanding in a free, full, and consequently an agreeable activity.'

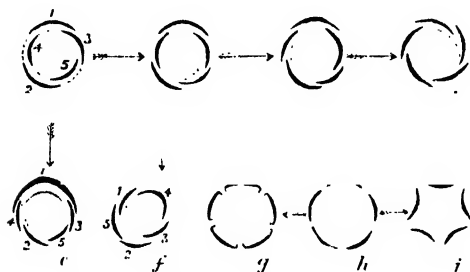
Ruskin has done much to awaken and extend the appreciation and enjoyment of art in this country, and in several of his works discusses æsthetic theories; especially in *Modern Painters* he has attempted a systematic exposition of our ideas of beauty. Beauty is typical or vital, the former falling under the heads of infinity, unity, repose, symmetry, purity, moderation—all typical of divine attributes; while vital beauty is relative or generic. Ruskin's position is that of an extreme spiritualist, and takes no account of the value of association at all.

Bain, a prominent representative of the empirical school, has largely treated of aesthetics in his work on *The Emotions and the Will*, and has made an elaborate analysis of the elements in our perception and enjoyment of beauty. Herbert Spencer has endeavoured to establish an original theory of the origin of our pleasure in beauty and art, based on the doctrine of evolution as developed by him.

Others who have contributed to the discussion of the problem are Jean Paul Richter in Germany; in France, Jouffroy and Taine; and in Britain, Reid, Addison, Dugald Stewart, and Lord Kames. Schasler, Zimmermann, Lotze, and Carrière have written in Germany works on the history of

æsthetics; in France, Lévêque; and in his *Mental and Moral Science*. Professor Bain discusses the principal theories. American writers are Jarves, Bascom, Kedney, and Torrey. See the articles on ART, ASSOCIATION OF IDEAS, EMOTION; Hegel's *Phil. of Fine Art* (transl. by Bosanquet, 1887); Lotze's *Outlines of Æsthetics* (transl. by Ladd, 1887).

Æstivation (Lat. *æstivus*, 'belonging to summer'), or PRÆFLORATION, a term employed to denote the manner in which the sepals and petals are disposed in the flower-bud. The different modes of æstivation are different solutions of the problem of packing the floral envelopes into smallest bulk, and some of the arrangements are apparently the result of twisting. The æstivation of the sepals is often different from that of the petals. The



Various forms of Æstivation regarded as modification of the quinquevalve or valvate type:

a, quinquevalve; b, half imbricate; c, imbricate; d, contorted; e, vexillary; f, coxillate; g, valvate; h, valvate imbricate; i, valvate imbricate.

precise arrangement in a flower can be readily seen by making a cross section of the bud, but some of the commonest forms may be noted. When the parts meet but do not overlap, the arrangement is called *calcarate*; but if the adjacent margins are *interlocked*, the term *calcarate* is used. In many cases, each part overlaps its neighbour at one margin, and is still overlapped at the other, and to this the term *contorted* is applied. In *imbricate* æstivation, the parts successively overlap from the first, which is wholly external, to the last, which is wholly internal. The term *quinquevalve* is applied to an exceedingly common arrangement in which two parts are external, two internal, while the fifth overlaps one of the internal parts and is overlapped by one of the external. In the papilionaceous corolla (see LEGUMINOSÆ), the standard overlaps the wings, and they in turn overlap the keel. In the poppy, the petals are much crumpled in the bud.

Ætheling. See **ATHELING**.

Æthrioscope is an instrument for measuring the minute variations of temperature due to the condition of the sky, and consists of a differential Thermometer (q.v.) whose bulbs are both within a cup-shaped mirror, one being in the focus of the mirror.

Ætiology, or **ETIOLOGY** (Gr. *aitia*, 'cause,' and *logia*, 'discourse'), the science or philosophy of causes and causation, especially (1) the department of biology, which seeks to give a rational account of the forms, functions, and history of organisms (see DARWINIAN THEORY, and EVOLUTION); (2) the branch of medicine which investigates the causes and origin of diseases.

Ætius, a great Roman general, born in Moxia towards the end of the 4th century A.D. He was for a time a hostage amongst the Huns. He led an army of Huns to the support of the usurping

Emperor John; and by help of the Huns compelled the empress-mother Placidia to advance himself at the expense of his rival Bonifacius. In 433 he became patrician, consul, and general-in-chief; and as such maintained the empire against the barbarians for twenty years, defeating West Goths, Burgundians, rebellious Gauls, and Franks. But his 'crowning victory' was that at Chalons over Attila (q.v.) in 451. In 454 the Emperor Valentinian III. (q.v.), jealous of his greatness, stabbed him to death with his own hand.

Ætna. See **ERNA**.

Ætolia, a district of ancient Greece, lying on the N. coast of the Gulf of Corinth. It was divided from Acarnania by the river *Achelous*, and on the N. touched Thessaly. In later times, these boundaries were considerably extended to the N. and E. The country had few cities; was, except on the coast, generally wild and barren. Here, according to the legend, Meleager slew the Calydonian boar. The Ætolians make a great figure in the heroic age of Greece; but at the time of the Peloponnesian war, they were rude and barbarous. The Ætolian Confederacy, first called into existence about 323 B.C., became an important rival to the Achaean League (see **ACHAIA**). Their assembly was styled the *Panætolicon*. They sided with the Romans against the Achaean League, but afterwards aided Antiochus III. against the Romans, and were subjugated by the Romans in 189 B.C., though not formally included in a Roman province till 146. Along with Acarnania, Ætolia now forms a department of the modern kingdom of Greece, with a united area of over 3000 sq. m. The mountains in the NE. are offsets of the Pindus chain, and slope steeply on the SW. down to the central plains. The chief towns are Missolonghi and Lepanto.

Affidavit (from the perfect tense of a barbarous Latin verb, *affido*—e.g. *A.B. affidavit*, 'A.B. hath sworn'), an oath in writing, or a written declaration made before a magistrate, or other person legally authorised to administer an oath, the truth of which is confirmed either by an oath sworn, or a solemn affirmation emitted in terms of 18 Viet. chap. 25, and the other statutes referred to under **AFFIRMATION**. Where evidence is required in England (to be laid before a court, it is frequently given by affidavit, and not by oral examination. This is almost invariably the case on interlocutory applications before trial—e.g. for discovery of documents. Many isolated facts require proof by affidavit—e.g. service of proceedings; the condition of a will with alterations of which probate is asked, &c. Where the whole evidence is given by affidavit, a practice discouraged in England since the union of the Common Law and Equity Courts, the plaintiff first files his affidavits in chief, and these are replied to by the defendant's affidavits. The affidavit consists of title, body or statement, and jurat. An affidavit ought to set forth the matter of fact only, and not to declare the merits of the cause, of which the court is to judge. The name and designation of the party making the affidavit are written at length, and he signs it at the foot. When the paper is shown to him, he is required to swear or affirm that its contents are true, and that the name and handwriting are his. Affidavits in all the English courts must be taken and expressed in the first person of the deponent. The *Jurat* specifies the officer before whom, the place where, and the time when it was sworn, and this is signed by the officer or magistrate. When an affidavit is sworn in open court, that circumstance is mentioned, and no officer is named. In Scotland, voluntary affidavits are not generally received as evidence, because they are *ex parte* statements, no opportunity being afforded

for cross-examination. To this rule, however, there are exceptions. Claimants are required by the Bankrupt Statute to lodge their claims with affidavits or oaths of verity; but these may be rejected by the trustee, and are in no sense conclusive. An affidavit is sometimes required also at common law, as in applications for warrants *in meditatione fuge*, and, as in England, on various interlocutory applications—e.g. for postponement of trial, or for commission to examine before trial sick and aged witnesses. Apart from judicial proceedings, affidavits are required by imperial statutes in a great many circumstances which make a deliberate and formal statement, under the sanctions of perjury, desirable in the public interest. By statute in 1836, justices are prohibited from taking affidavits in matters as to which statutory jurisdiction has not been conferred on them. Scottish justices can act in England, and *vice versa*. In the United States the law is very similar. The affidavit of parties to a cause is received upon incidental questions addressed to the court, and auxiliary matters not affecting the issue. An affidavit made solely on information or belief is not sufficient for the arrest of any person charged with an offence against the laws of the United States.

Affiliation, or **FILIATION**, is the name given to an action brought in the Sheriff Courts in Scotland, by the mother of a bastard, to recover aliment from the putative father. It is the equivalent of the proceeding for a Bastardy Order before the Justices in England; and under the Summary Jurisdiction Process Act, 1881, the inferior courts of both countries have been freed from many difficulties as to jurisdiction in this matter. The rates of aliment allowed against the father vary in different districts in Scotland; in Glasgow it is £8 per annum until the age of 7 or 10, or some other fixed age, when the mother's right of custody expires, and the father may make his arrangements for the child's maintenance. A debt of this nature may still be enforced by imprisonment. There are risks of fraud and extortion in any system of affiliation, and occasionally difficult questions of medical jurisprudence have occurred with reference to the transmission of personal features—e.g. colour of skin or hair, or of personal diseases and deformities. On the whole, however, affiliation is more wholesome than the French system of refusing to inquire into paternity.

Affinity (Lat. *affinitas*), the relationship created by marriage between the husband and the blood-relations of the wife, and between the wife and the blood-relations of the husband. The relatives of the wife stand to the husband in the same degree of affinity in which they stand to the wife by blood or consanguinity, and *vice versa*. But between the relatives of the two parties by affinity there is no affinity. Thus, there is no affinity between the husband's brother and the wife's sister; and by our law, there is no impediment to their marriage. The question as to whether those who are related by affinity stand in all respects in the same position as regards marriage with those connected by blood, is one on which much difference of opinion at present prevails. The degrees are differently computed in the Roman and the Canon Law. Marriage between a man and the sister of his deceased wife is at present forbidden by statute in England, and, since the case of Fenton and Livingsone, it has been supposed to be forbidden in Scotland by the Act, 1567, chap. 15. An attempt is annually made in parliament to obtain an alteration of the law. It has already been altered in several of the British colonies. In the United States a man may marry the sister of his deceased wife, or a woman may marry the brother of her deceased husband. In

other respects the law is substantially as in England: a person cannot by legal succession receive an inheritance from a relation by affinity. See **CONSANGUINITY**, **DECEASED WIFE'S SISTER**, **MARRIAGE**.

Affirmation, a solemn declaration which, in the case of persons holding conscientious scruples, is admitted in lieu of an oath. By acts of 1833 and 1834, and of 1838, it is provided that Quakers, Moravians, and Separatists who, from conscientious scruples, refuse to take an oath in courts of justice, may, both in civil and criminal cases, make a solemn affirmation, according to a prescribed formula. For Quakers and Moravians the formula is: 'I do solemnly, sincerely, and truly declare and affirm.' In the case of Separatists, this affirmation further bears to be emitted 'in the presence of Almighty God.' The penalties of perjury are imposed on those who shall be proved to have affirmed falsely. The statute of 1855 extended the privilege to all persons who refuse to be sworn from conscientious motives; and that of 1869 extended the right of making an affirmation in a court of justice to all on whose conscience an oath would not be binding. The evidence in court of a person too young to be sworn, is called in Scotland a declaration. In the United States also, Friends and others who have religious scruples against taking an oath, are permitted to make a solemn religious affirmation or asseveration in confirmation of the testimony they are about to give; and affirmation subjects a false witness to the same penalty as an oath. See **OATH**.

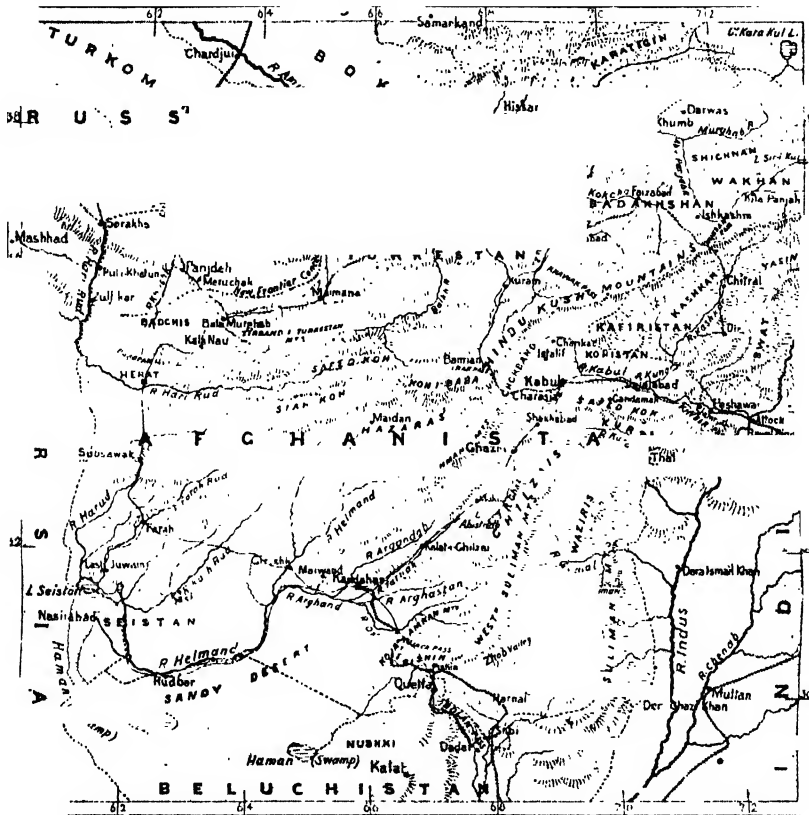
Affre, DENIS AUGUSTE, was born 27th September 1793, and in 1840, on account of his prudent and temperate character, was made Archbishop of Paris by the government of Louis Philippe. Though not yielding a blind submission to all the measures of that government, he abstained from offensive opposition; and when in 1848 a republic was proclaimed, he kept aloof from political strife, but displayed earnest care for the public welfare. During the June insurrection, he climbed on a barricade in the Place de la Bastille, carrying a green bough in his hand, as a messenger of peace; but he had scarcely uttered a few words, when the firing recommenced, and he fell mortally wounded, to die next day, June 27. He was the author of several theological writings, and of a work on Egyptian hieroglyphics.

Affrontée, in Heraldry, fronting the spectator, as the lion sejant affrontée, which is the crest of Scotland.

Afghanistan is the country lying to the north-west of India. Its boundaries are, on the north, the Oxus or Amu Daria, from its source in Lake Victoria or Sir-i-Kul to Khoja Saleh, and thence a line drawn across the Turkoman desert south-westward to the Murghab, passing south of Panjdeh, and touching the Hari-Rud at Zulfikar. This line has been demarcated in accordance with the London protocol of 1885 and the St Petersburg treaty of 1887. On the north-east, Afghanistan is bordered by a mountainous region, inhabited by tribes of various nationalities, but for the most part speaking Afghan dialects, and settled in the fertile but almost inaccessible valleys of the Upper Indus and its tributaries. On the east, the frontier runs along the eastern foot of the Suliman Mountains; but here again some of the tribes are almost independent, and the Indian government controls the more important passes. On the south, a line passing north of Quetta in about the 30th parallel of N. lat., divides Afghanistan from the territory of the khan of Kalāt and Beluchistan; while on the west, the meridian of 61° E. long. would approximately define the boundary with Persia.

Within these limits, Afghanistan extends 400 miles from north to south, and 600 miles from east to west, and contains an area which may be roughly estimated at 240,000 sq. m., or about twice the size of Great Britain and Ireland. This includes Badakhshan and Wakhan in the north-east, and Afghan Turkestan in the north, comprising the Uzbek States of Balkh, Kunduz, Maimana, Shibarghan, Khulm, Akehi, and Andkhōi, owing allegiance and paying tribute to the Ameer. Afghanistan may be divided into the three great river-basins of the Oxus, the Indus, and the Helmand. (1) Oxus basin. The northern slopes of the Hindu Kush are drained by a number of rivers flowing northwards towards the Oxus;

only two, however—the Kokcha and Kunduz—reaching that river, while the remainder are either absorbed in irrigation, or disappear in the sands. The westernmost of the series—the Murghab and Hari-Rud—are of great importance, owing to the geographical position and fertility of their valleys, affording two lines of approach to Herat from the north. (2) The Indus basin includes the great basin of the Kabul itself and its tributaries, draining the southern slopes of the Hindu Kush and the northern valleys of the Safed-Koh; the basin of the Kuram, commanding a well-known approach to Kabul from the Indian frontier at Thal; and the streams issuing from the Waziri hills and Suliman range. (3) The Helmand, with its three great



tributaries, the Argandab, Tarnak, and Arghastan, drains all South-western Afghanistan. Afghanistan is for the most part an arid, mountainous country, and cultivation is only met with in some of its valleys.

According to Holdich, the principal mountain systems of Afghanistan are the Hindu Kush, with its westerly continuations, the Koh-i-Baba, Paghman, Safed-Koh, and Siakh-Koh. The Hindu Kush takes its rise in the north-east, where it abuts on the north-western end of the Himalayas in a group of magnificent peaks, rising to a height of 23,000 feet above the sea. Hence it extends in a south-westerly direction to the Khawak Pass as a single range of great height. Farther west it diminishes in altitude, and divides into a system of parallel chains, with high plateaus and valleys between them. The Safed-Koh, not to be confounded with the range of the same name in North-western Afghanistan, divides the Kabul from the Kuram, and has no geographical connection with the Hindu Kush, while the Suliman hills form the edge of the

plateau on the Indian side. The climate of Afghanistan is as diversified as its physical configuration. At Ghazni (7279 feet) the winter is extremely rigorous, and for several months the inhabitants are snowed up in their houses. At Kabul (5600 feet) the cold is severe for two or three months, but the summers are temperate. At Kandahar the winters are milder, but the heat in summer is intense (110° F. in the shade). The climate of Seistan, in the south-west of Afghanistan, is hot and trying; while that of Herat, in the north-west, is temperate; though here, as in other parts of Afghanistan, violent north-westerly winds and dust-storms are frequent.

Fevers, intermittent and remittent, and diseases of the eye, are among the most common complaints of the Afghans. The population of Afghanistan is composed of a variety of nationalities, and is estimated at about 4,900,000. The Afghans proper, or Pathans, number about 3,000,000, and are divided into tribes or clans—Durānis, Ghilzāis, Yūsufzāis, and others. The

Durānis are the dominant tribe: the Ghilzais, the strongest and most warlike; the Yūsufzais, the most turbulent. Of the non-Afghans, the Tajiks are probably the most numerous, and are the agricultural and industrious portion of the population; the Hindkis and Jāts chiefly live in the towns, and are traders; the Kizilbashs are Turko-Persians, and form the more educated and superior class; while the Haziras, a race of Mongol origin, in the mountainous districts on the north-west of Afghanistan proper, are nomads. The Afghans claim descent from King Saul, and call themselves 'Bani Israhil'; but though their features are of a Jewish type, and some of their customs have a curious analogy to those of the Jews, their language--the Pakhtu or Pushtu has no affinity with the Semitic tongue, but rather belongs to the Aryan family. In religion they are Sunni Mohammedans. In character they are proud, vain, cruel, perfidious, extremely avaricious, revengeful, selfish, merciless, and idle. 'Nothing is finer than their physique, or worse than their morale,' says an intelligent observer.

The Afghans do not as a rule inhabit towns, except in the case of those attached to the court and heads of tribes. The townsmen are mostly Hindkis and other non-Afghan races, who practise various trades and handicrafts considered derogatory by men of rank. The houses or castles in the country are all inclosed by high walls, and contain three or four different courts, laid out in gardens, with ponds and fountains, much the same as in Persia and Turkestan. The principal towns are Kabul (population 140,000), the seat of government and centre of a fertile district; Ghazni, a strong fortress; Kandahar, the chief city of Southern Afghanistan, with 30,000 inhabitants; and Herat, formerly considered the key of India. Among towns of secondary importance are Charikar, Istalif, 20 miles NNW. of Kabul, and Farah in Seistan.

Among the natural productions of Afghanistan is the plant yielding the asafoetida. The castor oil plant is everywhere common, and good tobacco is grown in the district of Kandahar. Aitchison says that the cultivated area round Herat produces magnificent crops of wheat, barley, cotton, grapes, melons, and the mulberry tree; the production being only limited by the amount of labour procurable. Surrounding the villages, and in orchards, the ash, elm, apricot, apple, plum, quince, peach, and pomegranate are cultivated; the surjit (*Elaeagnus orientalis*), yielding an edible fruit, and the zizyphus are indigenous. In special localities are forests of pistachio, its leaves being used in dyeing. The general appearance of the country during winter is barren and arid in the extreme, owing to the absence of trees and woody shrubs; but in spring a mass of vegetation springs up, giving a grand colouring to the landscape. The industrial products are silk, chiefly for domestic use, and carpets, those of Herat being of admirable quality. The manufacture of *postins*, or sheepskins, is one of the most important of the industrial occupations of the people, and of late years the trade in this article has greatly increased. Afghanistan is crossed by several trade-routes leading to India on the one side, and to Persia and Turkestan on the other; merchandise, however, is all transported on camel or pony back. Commerce suffers much from frequent wars and bad government. There is, however, some export of Afghan productions, particularly carpets to India; and Indian textile fabrics meet with a ready sale in Afghanistan.

The history of Afghanistan as an independent state only dates from the middle of the 18th century. Four or two centuries before, Herat and Kandahar had been in the possession of Persia; while

Kabul was included in the Mogul empire of Delhi. Upon the death of Nadir Shah in 1747, Ahmed Shah Durāni subjugated the different provinces, and when he died in 1773, left an empire to his son, Timur Shah, extending to the sea of Oman on the south, and on the east to the mountains of Tibet, the Sutlej, and the Indus. Timur Shah reigned twenty years, and dying in 1793, left thirty-six children, of whom twenty-three were sons. The rivalries and jealousies among these princes or sirdars, their attempts to concentrate absolute power in their own hands, their turbulence, cruelty, and treachery, kept Afghanistan in a constant state of warfare, and led to the interference, first of Persia, and then of the British. In 1809 Mountstuart Elphinstone was sent as ambassador to Kabul, and concluded a treaty with Shah Shuja, son of Timur Shah, at Peshawar. Shah Shuja soon afterwards abdicated, and his brother, Mahmud Shah, took possession of the throne. His vizier, Futtch Khan, restored prosperity to Afghanistan for a while, but was blinded and afterwards murdered. His death was avenged by his brothers, the ablest of whom, Dost Mohammed, made himself master of Kabul in 1826.

In 1834 Shah Shuja made an effort to recover his throne, and entered Afghanistan with an army of twenty thousand Afghans and Hindustanis, but was defeated by Dost Mohammed. The siege of Herat by the Persians in 1837, when it was successfully defended mainly through the exertions of Lieutenant Eldred Pottinger, and Dost Mohammed's signal victory over the Sikhs, attracted the serious attention of the British government. Lord Auckland, then governor general, declared war against Afghanistan in 1838, on the grounds that Dost Mohammed had unlawfully attacked the British ally, Ranjit Singh; that the military operations of the Afghans had betrayed a hostile purpose towards India, and that Shah Shuja, as the rightful heir to the Afghan throne, had placed himself under British protection. It was designed to establish a friendly power in Afghanistan, which should form the first line of defence against the threatened advance of Russia on India. In pursuance of this policy, on the 16th January 1839, an army of 21,000 men, under the command of Lieutenant general Sir John Keane, crossed the Indus, advanced without opposition through the Bolan Pass, and took possession of Kandahar. Ghazni was taken after some hard fighting, and on the 7th August, the Anglo-Indian army entered Kabul, where Shah Shuja was proclaimed Ameer. Dost Mohammed, deserted by his forces, retired beyond the Hindu Kush, and the conquest was regarded as complete. Sir William Macnaghten and Sir Alexander Burnes were established at Kabul as British political agents; and a body of Anglo-Indian troops was stationed there under General Elphinstone.

Events, however, soon showed that the British had altogether mistaken the character of the Afghans. Though Dost Mohammed had surrendered, his son Akbar Khan was actively engaged in a conspiracy, and on the 21 November 1841 an insurrection, caused, it is said, by the reduction of subsidies to the Afghan sirdars, broke out at Kabul. Burnes and his brother were hacked to pieces with Afghan knives, Macnaghten was treacherously shot seven weeks later at a conference with the Afghan sirdars, several British officers were slain, and the Anglo-Indian army, after being besieged in cantonments for sixty-five days, capitulated. It was then agreed that they should leave the country, and that Akbar Khan and his confederates should make arrangements for their retreat, and provide an escort. Depending on these promises, the British troops left Kabul on the 6th

January 1842, to return to India; but neither escort nor provisions were supplied, and the severity of the season increased the misery of the retreat. The fanatical tribes of the district harassed them on all sides, and out of 16,500, of whom 12,500 were camp-followers, only one man (Dr Brydon) escaped to carry the dismal tidings to General Sale at Jelalabad. To retrieve this disaster, General Pollock, in September 1842, advanced on Kabul, routed Akbar Khan, and having inflicted punishment on the Afghans, and rescued the English officers and ladies who had surrendered themselves as prisoners, led his army back to India.

Henceforward the policy of the new governor-general, Lord Ellenborough, was to be one of non-interference in the affairs of Afghanistan, and it was hoped that the Afghans would keep the peace. Soon afterwards, however, forming an alliance with the Sikhs, they assisted them in their war against the British, till a crushing defeat was inflicted on their combined forces by Lord Gough, at the battle of Guzerat, on the 21st February 1849, and Dost Mohammed fled across the Indus. On the 30th March 1855, he concluded a treaty with the British, and in 1863, soon after the capture of Herat, which he had besieged for ten months, he died, and was succeeded by Shere Ali Khan, one of his younger sons. At first, the choice was acquiesced in by the other brothers, but disagreements soon arose, which for many years kept Afghanistan in a state of anarchy, and at one time the fortunes of the Ameer Shere Ali Khan were at a low ebb. The loss of a favourite son at the battle of Kajbáz (on the 6th June 1865) affected him so seriously that he ceased to interest himself in public affairs, and remained at Kandahar, while his rebellious half-brothers, Mohammed Aziz Khan, and Mohammed Azim Khan with Abdul Rahman Khan, the son of the former, were gaining repeated successes, and alienating the country from his rule. The capture of Kabul at length aroused him to action. Taking the command of his forces in person, he led them against the entrenched position of the enemy; but notwithstanding the impetuosity of the assault, and his personal gallantry, he was defeated, and fled with a small following towards Ghazni and Kandahar. Other attempts to restore his fallen fortunes were equally unsuccessful, and it was not till 1868 that he at length regained possession of Kabul. In that year he received assistance from the viceroy of India, Sir John Lawrence, to secure the position for which he had fought so hard. The next viceroy, Lord Mayo, met the Ameer in state at Ambala, in March 1869. At this meeting, it was explained to him that Her Majesty's government had no desire to interfere with the affairs of Afghanistan, except to check civil war, and by so doing, to secure the peace and prosperity of the country. This intimation was accompanied by another large present.

In 1870 the Ameer's eldest son, Yákub Khan, who had shown great ability as governor of Herat, and had, on many occasions, given his father valuable assistance, broke into open rebellion against him. In 1873 Abdulla Jan was proclaimed heir-apparent, and in 1874 Yákub was imprisoned by his father at Kabul. For some time previous to 1878 there had been an estrangement between Shere Ali and the British government; he had then made overtures to Russia, and had welcomed at his capital a Russian mission. In consequence of these new relations with Russia, Shere Ali was invited to receive a British mission; his refusal led, after some fruitless negotiations, to war, and hostilities began by forcing the entrance to the Khyber Pass towards the end of November. Severe fighting followed, but the English were everywhere successful. Before the end of December, Jelalabad was

occupied without resistance, and Kandahar a little later. Shere Ali fled from Kabul for Turkestan, and died at Mazar-i-Sharif towards the end of February 1879. Yákub Khan was proclaimed Ameer in the following month, and on the 26th May signed a treaty of peace with the British at Gandamak. It was provided that our representative should reside at Kabul, and that the British government should defend Afghanistan from foreign aggression, the Ameer receiving a subsidy; whilst the Kuram, Pishin, and Sibi valleys, the Khyber and Michni passes, were to remain under the control of the British government as part of a line of scientific defensible frontier for India. This settled matters for a time, but in September of the same year, the revolted troops of the Ameer surrounded and attacked the British residency. The Resident, Sir Louis Cavagnari, and his staff, with almost the whole of their Indian guard, were cut to pieces, after a desperate and gallant resistance. Measures were immediately adopted for punishing this outrage. Sir F. Roberts, with a force of over 6000 men, after defeating the Afghans at Charásia, 12 miles from Kabul, on the 6th October, took possession of that city on the 12th, when Yákub Khan abdicated, and put himself under British protection. All went well for two months, but early in December there were gatherings of the tribes in the neighbourhood of Kabul. Attempts to disperse them were defeated, and the British were beleaguered for ten days in their cantonments at Sherpur. The arrival of reinforcements, under General Gough, enabled them once more to take the field, and the war was continued in a desultory way.

In June 1880 Ayub Khan, a younger brother of Yákub Khan, the ex-Ameer, proclaimed a *ghaza*, or holy war, and announced his intention of marching on Kandahar, then in the possession of the British. A brigade under Brigadier-general Burrows was sent against him. On the 27th July, Burrows marched to attack Ayub at Maiwand, and was completely defeated, with the loss of over 1000 killed and wounded. A second reverse followed in August, when Brigadier-general Brooke's column was attacked, and had to retire with heavy loss, that officer being killed. Abdul Rahman Khan, who had been a pensioner of the Russian government in Samarkand from 1870 to 1880, in the meanwhile had come to terms with the British government, and had in July been recognised as Ameer. The withdrawal of the army of occupation had been decided on, when news of the Maiwand disaster was brought. To avenge this, General Roberts marched with a force from Kabul on the 9th August, and reached Kandahar on the 31st. On the following day he totally defeated Ayub Khan, the Afghan camp, artillery, and baggage falling into his hands, whilst Ayub himself escaped with a handful of horse. Before withdrawing, the British troops reduced to submission some refractory tribes, and completed the evacuation of Afghanistan by the end of April 1881. Abdul Rahman Khan, with the assistance of the British government, made himself master of the whole country.

Russia's proposal, in 1882, to delimit the frontier of Afghanistan was received coldly in England. In July 1884, however, a commission was appointed to demarcate the boundary between Afghanistan and the territory of the Turkomans. General Sir Peter Lumsden was nominated by the British government, and General Zelenoi by the Russian. The line on which the commissioners were to be engaged was from Kwája Sala on the Oxus, to Sarakhs. But after the annexation of Merv and the preliminary surveys of M. Lessar, in the valleys of the Khushk and Murghab, the Russian authorities took a different view. They

contended that the Paropamisus was the true boundary of Herat, and that the district of Badghis, inhabited by Saryk Turkomans, who had proffered their allegiance to the Czar, lay outside Afghan territory. Questions of such grave moment, it was further stated, required to be settled by the two European governments before the commissioners could enter on their duties, and General Zelenoi was, without further explanation, sent to Tiflis. General Lumsden waited for him for four months on the Murghab, with an escort of 500 men, besides followers. In the meanwhile, the Russian outposts were advanced so as to include part of the debatable land. By their occupation of Zulikar, 50 miles south of Pul-i-Khatun, the outposts of the two nations were brought into immediate contact, and it was only through the urgent remonstrances of General Lumsden that a collision was avoided. Matters were further complicated by the attack on Panjdeh, near the fork of the Khushk and Murghab rivers, by a force under the command of General Komaroff, on the 30th March 1885, and by his seizure of this important strategical position. During 1886 the demarcation of the frontier was proceeded with, and in April 1887 the British and Russian commissioners met at St Petersburg. After somewhat protracted negotiations, an agreement was effected, resulting in a compromise of the points at issue, concessions having been made on both sides. Russia obtained the valleys south of Panjdeh for 9 or 10 miles in the direction of Herat; on the other hand, the Ameer of Bokhara waived his claims to the pasture-lands on the left bank of the Amu Daria, south of Khoja Saleh. Russia now touches the north-western frontier of Afghanistan, and has developed her railway communication in this direction with extraordinary rapidity. Meanwhile Britain has fortified and garrisoned Yvetta in Turkestan, on the southern frontier of Afghanistan, and connected it with India by a railway extended (1887) as far as Pishin. In 1887 troubles arose between the Ameer and rebellious Ghilzais and other subjects, and severe struggles took place.

See Elphinstone's *Cabul* (1815); Kaye's *History of the War in Afghanistan* (1851, 4th ed. 1878); Bellew, *Afghanistan and the Afghans* (1879); Reports by Lumsden and Macgregor.

Afium-Kara-Hissar ('Opium Black Castle'), a city of Asia Minor, 170 miles ENE. of Smyrna. A chief article of trade is opium, whence the name. There are manufactures of felts, carpets, arms, and saddlery. The pop. is about 20,000.

Africa, a continent of the eastern hemisphere, forming a south-western extension of Asia, to which it has been attached since Eocene times by the narrow isthmus of Suez, now pierced by a canal 90 miles long. Africa is thus constituted an insular mass of irregular triangular shape, with base on the Mediterranean, and apex at the junction of the Indian and Atlantic waters, which bathe its eastern and western shores respectively. From Cape Blanco (37° 12' 40" N.) at Bizerta, Tunis, to Cape Agulhas (34° 51' 15" S.) in Cape Colony, it stretches across 72 of latitude, or about 5000 miles, disposed nearly equally on both sides of the equator. The extreme eastern and western points are Capes Guardafui (51° 14' E.) on the Indian Ocean, and Verd (17° 32' W.) on the Atlantic, a distance of about 4500 miles. But owing to the sudden contraction of the land at the Gulf of Guinea (4° 30' N.), whence, like both Americas, India, and other peninsular masses it tapers continuously southwards, the total area is considerably less than would seem to be indicated by these extreme distances. Including Madagascar and all adjacent insular

groups, it cannot be estimated at much more than 11,950,000 sq. m., or some 4,000,000 less than Asia or America. Of all the continents except Australia, Africa is the most uniform, heavy, and monotonous in its general outlines, unbroken by any bold projections seawards except the abortive Somali Peninsula, unrelieved by broad estuaries, bights, or inlets of any kind penetrating far inland, diversified only by the Gulfs of Cabes and Sidra (the Great and Little Syrtes) on the Mediterranean, by the Bight of Biafra at the head of the Gulf of Guinea on the Atlantic, and by the Gulf of Aden, Red Sea, and Gulf of Suez, separating it on the east side from the Asiatic mainland. Hence, although about three times larger than Europe, its coast-line scarcely exceeds 15,000 miles, as compared with the 19,000 of that more highly favoured continent.

Islands.—Geologically, Africa is nearly destitute of insular groups, almost the only islands that belong physically to the mainland being Ierba and one or two islets in the Mediterranean, and a few on the east side, such as Socotra, the 'spear-head' of the Somali Peninsula terminating at Cape Guardafui, and farther south, Pemba, Zanzibar, and Mafia, almost forming parts of the adjacent coast. Perim, Dahlak, and a few others in the Red Sea, are mere coral reefs, dominated here and there by volcanic crests. The Comoro group between Madagascar and Mozambique is also volcanic; while Madagascar itself and the outlying Mascarennas (Mauritius, Réunion, and Rodriguez) appear to be surviving fragments of a Miocene continent, now flooded by the waters of the Indian Ocean. On the west side, the little Bissagos group alone forms a geological dependency of the mainland. Annabon, St Thomas, Prince, and Fernando Po, in the Gulf of Guinea, as well as Madeira, the Canary, and Cape Verde archipelagoes, are all of volcanic origin, the latter being separated by profound abysses of over 3000 feet from the continent. Lastly, St Helena and Ascension are mere rocks lost amid the Atlantic waters.

Relief of the Land.—Corresponding with the somewhat shapeless and uniform continental contour, is the generally monotonous character of the interior, which is relieved by no great central highlands or conspicuous water-partings at all comparable to those of the other great continental regions. Although still far from completely explored, the lie of the land is already sufficiently understood, at least in the main features of its general relief. We now know that the somewhat premature generalisation, which compared it to 'an inverted basin,' gives a very inadequate, if not absolutely misleading idea of its true conformation. The outer rim of mountain-ranges is not nearly so continuous and uniform as this comparison would imply; while the interior is disposed, not in one vast elevated plain, but in two well-marked physical regions—a great southern tableland with a mean altitude of over 5000 feet, falling northwards to a much lower but still elevated plain with a mean latitude of about 1300 feet. Owing to this generally high altitude, and to the almost total absence of extensive low-lying plains, such as the Russian steppes and Siberian tundras, Africa, notwithstanding the lack of vast alpine regions like the European Alps and Pyrenees, or the Asiatic Himalayas and Kuen-lun, has nevertheless a greater mean elevation (1900 to 2000 feet, Chavanne) than either Europe (1000), or even Asia (1650).

A line running from the Cameroons northwards to the Benue, and sweeping round Mount Atlantika (last northern outpost of the tableland in Adamawa), eastwards to the Red Sea below Suakin, will roughly mark off the comparatively

the Masai plateau appear to be the most extensive on the continent, and at many points present signs of recent activity. But elsewhere the old plutonic prevail immensely over the more recent eruptive rocks, just as the older sedimentary do over the later tertiary and quaternary formations. Both orders appear to be generally intermingled, and largely associated with semi-crystalline and metamorphic forms, such as the schists, gneisses, graywackes, and hornblendes, about Kilima-Njaro and many other places. The Kamasia Range (8000 to 9000), N.E. of Victoria Nyanza, is essentially metamorphic (white striated felspar, quartz, and black mica), while shales and flaggy sandstones form the geological basis of the East African carboniferous series, which extends in a narrow strip from near the equator continuously to the Cape. Hard granite forms the bed of the Orange River, and ashes, soapstone, coal, iron, and copper were amongst the specimens collected by Farini in the Kalahari steppe. Metamorphic rocks, again, prevail in the Congo basin, where iron and copper ores also abound, and where plutonic systems succeed above Stanley Pool (Johnston). Syenite, and other granites, with old sandstones, are the characteristic features of Upper Egypt and the Nubian steppe; while Abyssinia has also a granitic base underlying dolerites, trachytes, and crystalline slates. But here the eastern slopes, skirted or traversed by the great volcanic zone, are strewn with obsidian, pumice, and other recent lavas.

A great diluvial plain stretches from this region through Senaar southwards to the crystalline slates, associated with magnetic iron ores of the Baginze slopes, about the source of the Welle. Even the Sahara, long supposed to be a recent marine basin, is characterised by the absence of late sedimentary rocks and marine fossils, and by the prevalence of old sandstones, quartz, and carboniferous limestones, largely disintegrated by weathering. It also abounds in rich saline deposits, forming a chief article of trade with the neighbouring Sudan, which is distinguished by the almost total absence of salt, the prevailing formations here being crystalline rocks, granites, diorites, slates, gneiss, again associated with sandstones in the higher ranges. In the Kong uplands, the sandstones overlie the granites, which in the Teggele group (Kordofan) pass over to porphyries and syenites, with gneiss interspersed with extensive diorite and auriferous quartz veins. Gold, mined by the ancient Egyptians at Mount Elba, Red Sea coast, occurs also in many other places, as in Upper Guinea, the Lower Zambesi, and Transvaal; and gold dust has at all times formed a chief article of export. But iron and copper are the characteristic metals, ferruginous ores abounding almost everywhere, and copper in Namaqualand, the Congo basin, Dar-Fertit, and many other places. The basin of the Vaal is one of the richest diamantiferous regions on the globe. In this southern region, granites and crystalline slates form the substratum of an extensive series of fossiliferous rocks, descending from the outer rim (Nier veldt) down to the coast in a series of terraces ('karroos'), which are baked clay in the dry season, but flowery and grassy meads in the wet season.

The African hydrographic are drawn in bolder lines than its orographic systems. Here also a certain symmetry prevails, the two great southern basins of the Congo and Zambesi balancing those of the Nile and Niger of the northern plain, while the secondary Orange and Limpopo, in the extreme south find their counterparts in the Senegal and Draa of the NW. The Zambesi and Limpopo, together with the Kevuma, Juba, and a few other coast streams, flow to the Indian Ocean; all the others, together with the Cunene, Koanza,

Ogoway, Volta, Gambia, Tensift, Muluya, and Mejerda, to the Atlantic, either directly or through the Mediterranean. Nearly all are still entangled in the intricacies of the interior, hence are obstructed either along their middle or lower courses by formidable falls and rapids, such as the stupendous Victoria Falls on the Zambesi; the Yellala and Isangila on the Lower, and Stanley on the Middle Congo; the so-called 'Six Cataracts,' the Ripon, Murchison, and many others, all along the Nile above Egypt; the 'Hundred Falls' of the Middle Orange. Freest from these impediments are both the Niger and its great eastern affluent the Benue, which latter affords a clear navigable highway into the very heart of Sudan. Here a scarcely perceptible water-parting, which might be easily canalised (Flegel), separates it from the Shari, which gives farther access by water northwards to Lake Tsad, south-eastwards towards the Nile and Congo basins. In this still unexplored region, the Shari, with its numerous head-streams, approaches the Makua-Welle, which its discoverer, Schweinfurth, supposed to flow from the Monbattu uplands NW. to the Tsad, but which the quite recent explorations of Grenfell, Lupton, and Junker send SW. through the U-banghi to the Congo basin. For other doubtful points, such as the course of the Ogoway, Alima, Sankuru, the drainage of Lake Leopold, &c., all rapidly cleared up in recent years, see below under History of African Exploration.

But apart from its great rivers, including the historical Nile, earliest seat of human culture, Africa possesses a magnificent equatorial lake system, elsewhere unrivalled except by the great North American lacustrine basins. These are the crowning glory of modern African research, all having been revealed to science by English-speaking explorers (Livingstone, Speke, Grant, Burton, Baker, Stanley) since the middle of this century. They are grouped towards the east side of the continent between 15° S. and 4° N. lat., and all stand on the southern tableland, draining seaward through the Zambesi (Nyassa, with outflow Shiré), the Congo (Tanganyika, with intermittent outflow Lukuga), and the Nile (Alexandria Nyanza, Victoria Nyanza, Mwtan Nzigé, and Albert Nyanza, with outflow Somerset Nile). The Alexandra (Akanyarn) drains north-eastwards through the Alexandra Nile (Kagera) to the Victoria, queen of African lakes, and, next to Superior (33,500 sq. m.), the largest fresh-water basin (26,600 sq. m.) on the globe. The Shiniyu, another affluent from the south, may be regarded as the farthest head-stream of the Nile, which thus rises about 5° S. lat., flowing thence northwards to the Mediterranean for some 4300 miles, a course probably a few miles longer than that of the Missouri-Mississippi, the next longest in the world. Some confusion still prevails regarding the Albert Nyanza and Mwtan Nzigé, which were long taken as alternative names of a continuous sheet of water now known to form two distinct basins. Hence, Mwtan Nzigé may be conveniently restricted to the southern, and Albert Nyanza still retained for the northern lake, which is nearly 2000 sq. m. in extent. In 1887 Emin Pasha reported his conviction that the Albert Nyanza (q.v.) is silting up. The outflow of Tanganyika was also a somewhat doubtful point, until the surveys of Thomson, Hore, and Wissman made it quite certain that it drains westwards through the Lukuga, at least intermittently to the Congo. This adds considerably to the drainage area of the Congo, which ranks next to the Amazon for volume, discharging probably as much water as all the other African rivers together (Reclus). Since its identification by Stanley with the Lualaba, its farthest head-stream

appears to be the Chambeze, an eastern feeder of Lake Bangweolo, rising in 10° S. lat., 33° E. long., and giving to the Congo system a total length of considerably over 3000 miles.

The equatorial lake system is thus distributed among the three great fluvial basins of the Zambesi, Nile, and Congo. But scattered over the continent are several other lacustrine basins, varying greatly in size, which have no seaward outflow, but form independent, or, at all events, now isolated centres of inland drainage. By far the most extensive of these are Lakes Tsad (Chad) and Ngami, again symmetrically disposed on either side of the equator, and fed, the former by the Shari and Komadugu, the latter by the Tonka. Both vary greatly in extent with the wet and dry seasons, and there is good reason to believe that formerly both had emissaries, Tsad to the Benue-Niger, Ngami to the Limpopo basin. True alpine lakes, such as those of the Swiss and Bolivian highlands, are represented only by the Abyssinian Lake Tana (Tsana or Dembea, 6100 feet), which has an area of some 1200 sq. m., and a depth of over 300 feet. It is fed by numerous alpine streams, amongst which is the Abai, farthest source of the Bahr-el-Azrak, or Blue Nile, which, after sweeping round the Abyssinian plateau, joins the Bahr-el-Abiad, or White Nile, at Khartum. Before the discovery of the great lakes, Tsana was considered by many geographers as the chief reservoir and farthest source of the main stream. The great oceanic and inland hydrographic systems of the continent may now be tabulated thus:

SEAWARD BASINS—

Nile	1,500,000
Congo	1,350,000
Niger	1,150,000
Zambesi	850,000
Orange	400,000
Limpopo	200,000
Selwadu	150,000
Ogoway	150,000
Smaller basins and dried-up drainage	3,000,000

Total seaward

INLAND BASINS—

Tsad	750,000
Ngami	320,000
Ighargh, Messiwara, and other dried-up areas of inland drainage	1,850,000

Total inland 2,920,000

Climate. Above all the great divisions of the globe, Africa is distinguished by the general uniformity of its climatic phenomena, a circumstance due to its massive form and intertropical position. In the region approaching nearest to the northern or southern equinoctial lines, rain falls throughout the year, thanks to the opposing trade-winds, which, by neutralising each other, often preserve the stillness of the atmosphere, and enable the local vapours to condense and precipitate themselves on the spot. In the northern hemisphere, a zone of two wet seasons stretches from the equator to the 15° lat. In summer, copious showers are caused by the moisture-bearing SW. winds; in winter, the NW. currents become in their turn the bearers of heavy rain-charged clouds to the southern plateau. But on both sides of the torrid zone, comprising about seven-tenths of the whole continent, the difference in the disposition of the winds causes a corresponding contrast in the rainfall. Here the trade-winds maintain their normal direction constantly, or with but slight temporary deviations. Blowing from the NE. in the northern, from the SE. in the southern hemisphere, they divert to the equator most of the vapours crossing their path, leaving elsewhere clear skies and arid lands. Thus it happens that

Africa has two almost completely barren zones of rocks, gravels, marls, clay, and sand—the Sahara and Libyan desert in the north, Kalahari and other wastes in the south. This regular disposition of the climates is completed by the regular alternation of winds and rains in the zones of Mauritania and the Cape, both belonging to the region of sub-tropical rains, which fall in the respective winters of each hemisphere. Africa is thus disposed from north to south in successive gray and more or less intensely green belts, whose limits coincide in several places with the isothermals, or lines of equal temperature. The lines indicating mean annual temperatures of 68° and 75° F., traverse, in the north, the Mediterranean seaboard and the Sahara respectively; in the south, the Orange basin and a zone stretching obliquely from Mozambique to the Cameroons; while the area of greatest mean heat (82° F.) is comprised within an irregular curve inclosing the Upper Nile basin between Khartum and the Albert Nyanza north and south, Lake Tsad and Massowah (Massawah) west and east. But, through defective or incomplete observations, the general temperature has often been exaggerated; that of Gambia, for instance, has been reduced by the Colonial Official Report for 1886 to about 70° F. for January, and 80° to 82° for July *at noon*. Nevertheless, owing to the far greater accompanying moisture, these relatively moderate heats are far more oppressive than those of the Baluchistan coast and other drier regions, where the glass constantly rises to 115°, and even 120° F. and 125° F. For the same reason the climate, except on the Mediterranean, Arabian, Red Sea, and extreme south coasts, is nearly everywhere malarious round the periphery of the continent—that is, on the low lying and generally marshy coast-lands between the outer rim and the sea. It is the same in the Chambeze, Malagarazi (Uyanywesi), Shari, and other inland districts, which are either constantly or periodically under water. But elsewhere, with due precautions, the continent cannot be regarded as insalubrious; and the Sahara, for instance, is distinctly a healthy region, although, owing to rapid radiation, the hot days are here succeeded by cool and occasionally even frosty nights. The mean annual rainfall ranges from under four inches in the Sahara and about ten in the Kalahari, to sixty and eighty about the equator, and from eighty upwards on the Guinea coast. Under all these conditions, Selwefurth, for many years a resident in Africa, considers that a European colonisation of most of this continent is a possible future contingency.

Flora.—About 41 per cent. of the surface is said to be either desert, or under scrub, or otherwise absolutely waste, and 35 per cent. steppe, or nearly treeless grass grown savannah, leaving only 24 per cent. for forest and arable lands. But too much weight cannot yet be attached to such broad statements as these, and all that can be concluded from a comparison of recent observations is, that the grassy tracts appear to be far more and the woodlands far less extensive than had been supposed. The continuous forest growths are now known to be confined mainly to the vast equatorial region between the Upper Zambesi and Sudan, and to some isolated tracts about the Abyssinian plateau, in the Moroccan Atlas, all along the Guinea coast, about the Middle Limpopo and Zambesi, and in parts of Masai Land and the Upper Nile basin. From Sierra Leone to the river Ogoway, along the coast, the one prevailing landscape is that of endless forest. This is, in fact, part of the forest region—the forest belt, which has a distinctive fauna and flora, and which extends eastwards, near the equator, more than half-way across

Africa to Lake Victoria Nyanza and the western shores of Tanganyika' (H. H. Johnston, *The River Congo*, p. 13).

In the extreme north, African and South European species intermingling with some local varieties, and here are found the olive, date, and cork, with seven other kinds of oak, besides the eucalyptus, recently introduced from Australia, all flourishing side by side. Nevertheless, the graminaceæ are predominant, and vast tracts in Algeria and Tunis are covered with halfa (alfa), largely exported to England for paper-making. The papyrus itself, whence the word paper, still lingers in the Upper Nile, although in the Lower Nile the lotus and other characteristic plants have been mostly replaced by cereals, cotton, tobacco, and other economic species. Beyond Egypt, the date gives place to the dūm and deleb palms, wheat and rice to durra; while in the forest regions of Sudan and Guinea, the prevailing species are the magnificent baobab (*Adansonia*), the banana, butter-tree, ebony, *Elæis guineensis* or oil-palm, which yields the palm-oil of commerce, the musanga, the mangrove, ground-nut, dragon-tree, acacias, mimosas, and other gum-trees, succeeded, in Galla and Somali Land, by aromatic shrubs and the coffee shrub, supposed to take its name from the Kaffa country, south of Abyssinia. Another variety of this shrub is indigenous in Liberia, whence it has lately been introduced into Ceylon and other coffee-growing lands. Indigenous to Africa is also the cotton-plant, which, like indigo, is widely cultivated in Egypt and Sudan, and which grows wild in many places as far north as 19° N. lat. But of all African floras, the most characteristic, as well as the richest and most diversified, is that of the Cape region south from the Orange River. It consists chiefly of grasses, shrubs, bushes, and lovely ferns, and heathers in greater variety than is found even in the richest European lands. Here, one might fancy, had been gathered, as in a last refuge, the diverse growths of the vanished 'Lemurian' continent, which is by some geologists supposed to have occupied the Indian Ocean down to the close of Miocene times. This supposition is strengthened by the character of the Malagascar flora, which possesses over forty genera peculiar to itself.

Fauna.—Africa is the peculiar home of the large fauna, many of which, owing to the absence of great central mountain barriers, freely roam from one end of the continent to the other, without undergoing any special modification of type. Such, among the carnivora, are the lion, far finer than its Asiatic congener, and met everywhere, from the Atlas and Nubia to the Cape; the panther and leopard, but not the tiger; the hyena, fox, and jackal. The great herbivora are represented by the elephant, differing both from the Asiatic and from the smaller and now extinct Mauritanian variety; the rhinoceros, of which there appear to be at least three species, including the one horned, now known to occur in Nubia, and perhaps also in Wadai; the buffalo, also in several varieties; the giraffe, elsewhere extinct, but here still ranging from north to south, a remark applicable also to the ostrich, as well as to the unwieldy hippopotamus, which, like the crocodile, frequents all the large rivers and lakes. Africa is also the special home of the gnu, and several other species of antelopes, sometimes still met in countless herds on both sides of the equator. The monkey family is also spread over the whole continent, when it is represented by numerous types, including the small Barbary variety, the dog-faced baboon, the Galago lemur, the beautiful colobus of the eastern regions, besides the anthropoid chimpanzees and gorilla of the west equatorial districts. Peculiar also are

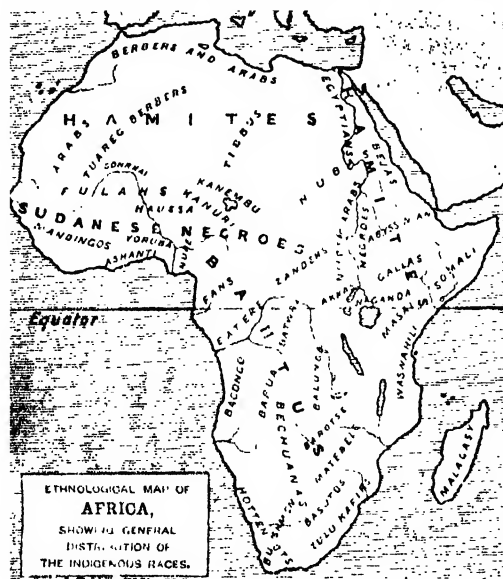
such equidae as the zebra, quagga, and pigmy Mauritanian ass, although the horse itself, like the camel, appears to have been reintroduced by the Arabs. Of land mammals there are altogether enumerated about 480 species peculiar to this continent, amongst which are 95 of the simian and 50 of the antelope family.

Equally distinct is the avi-fauna, which, besides the ostrich, includes the secretary, ibis, guinea-fowl, weaver-bird, roller-bird, love-bird, waxbill, whydah, sun-bird, parrots, quail, and several other indigenous species. Reptiles and insects also abound, comprising the huge python, many poisonous snakes, termites, locusts, and two little winged pests highly destructive to domestic animals—the tsetse fly, which ranges from Mozambique to Senaar, fatal to the horse, camel, ox, and dog; and the donderobe, south of Kilima-Njaro, which attacks the ass, goat, and sheep. The tsetse especially is one of the great impediments to the progress of culture, although it is said to disappear as systematic cultivation of the soil is developed.

Inhabitants.—Recent authorities roughly estimate the population of Africa at about 210,000,000, or 18 to the square mile, a density five times less than that of Europe, but still considerable, regard being had to the great extent of absolutely desert, forest, and other waste lands. According to the nature of soil and climate, the population is distributed very unevenly over the surface, being massed somewhat densely in the Nile delta, in the Upper Nile Valley, and generally throughout Sudan, less thickly over the southern plateau, and very thinly in Mauritania and Tripolitania; while large tracts, especially in the Western Sahara, the Libyan and Kalahari wastes, are absolutely uninhabited. Of the whole number, probably less than 1,000,000 are recent immigrants from Europe, settled chiefly in the extreme north (Egypt and Algeria) and in the extreme south (Cape Colony, Natal, and the Boer States). About 34,000,000, all of *Semitic* stock, are intruders from Asia, some in remote or prehistoric times (3,000,000 Himyarites in Abyssinia and Harar from South Arabia), some since the spread of Islam (over 30,000,000 nomad and other Arabs, chiefly along the Mediterranean seaboard, in West Sabara, and Central and East Sudan). All the rest, numbering about 175,000,000 altogether, may be regarded as the true aboriginal element. These are classed by Lepsius in two great physical and linguistic groups: *Hamites* in the north, *Negroes* in the south, meeting and intermingling in the intermediate region of Sudan. But this broad grouping is inadequate to explain the present conditions, for there are probably more than two indigenous stock races, and certainly more than two stock languages in Africa, while the races themselves are intermingled in the southern plateau quite as much as, if not even to a greater extent than in Sudan. The Arabic term, *Belad-es-Sudan*, 'Land of the Blacks,' answers to our somewhat obsolete expressions *Nigritia*, *Negroland*, which is commonly regarded as the true home of the black race. Certainly more ideal Negro peoples—that is, ideal in their departure from the European standard—are found in Upper Guinea, for instance, and among the Bari and Shilluk Nilotic tribes, than amongst the Bantus, as the Negro or Negroid peoples of the southern plateau are now collectively called. In general, it may be said that, viewed as a whole, the Negro family presents as profound deviations within itself as do the Caucasian and the Mongolian—that is, the two other great families of the eastern hemisphere. The deviations are even greater, if in the typical Negro group are to be included not only the aberrant Hottentots of the extreme SW., but also the pigmy peoples, such as

the Bushmen of the Kalahari steppe, the Obongos of the Gaboon, the Akkas south of Monbuttoland, and the diminutive Batwas, averaging only 4 feet 3 inches in height, discovered in 1886 by Dr Ludwig Wolf in the Sankuru (Middle Congo) basin. These western Negritos, scattered sporadically over the southern tableland, seem to stand in the same relation to their taller neighbours as the eastern Negritos (Andamanese, Malayan Samangs, Philippine Actas, Javanese Kalangs) to their taller Papuan neighbours; whilst their languages, such as that of the Bushmen, abounding in, to us, unpronounceable sounds known as 'clicks,' are said by some to form a sort of connecting link between articulate and inarticulate speech.

Radically distinct from these idioms is the Hotentot; which itself differs fundamentally from the Bantu, a vast linguistic family, current amongst nearly all the other peoples of the plateau, from the Ama-Khosas of Kafirland northwards to the Wa-Gandas of the Somerset Nile and the Duallas



of the Cameroons. This wonderful Bantu group, comparable in extent as well as in complexity of structure to the Aryan, Finno-Tartar, Athabaskan, and other widespread families in the other continents, gives a certain unity to the Bantu populations, who could not otherwise be distinguished by any hard and fast line from their northern Negro and Negroid neighbours in Sudan. Here the diversity of speech is as great as is the diversity of types produced by immemorial interminglings with the continuous Hamite peoples. But amid the general chaos of tongues awaiting future classification, certain relatively large linguistic groups have already been determined, which have so far helped to diminish the prevailing confusion. Such are the *Mandingan*, with many branches, in Senegambia; the *Sonhai* of Timbuktu and the middle Niger; the *Fulah* and the *Haussa*, both widely diffused throughout Western Sudan; the *Tibbu* (*Tedag* and *Dasaga*), ramifying from South Fezzan across the Central Sahara to Kanem, Bornu (Kanuri), Wanyanga and Dar-Fur (Bale and Zaghawa); lastly, the *Nubi* of Kordofan and the Middle Nile to the Egyptian frontier. All these, except the Tibbu, while differing radically from each other, seem to be essentially Negro forms of speech, although the true Fulahs are not a Negro, but

apparently a Hamitic people (Krause). On the other hand, the Nubas, hitherto supposed to be related to them, are now known to be true Negroes, whose type is preserved in Kordofan, and greatly modified in the Nile Valley (Keane). The recent researches of Nachtigal have also helped to determine the hitherto doubtful position of the Tibbus (the Garamantes of the ancients), who occupy the whole of Eastern Sahara, from about 12° E. long., and whose true home appears to be the Tibesti highlands. Physically, they are not to be distinguished from their Tuareg (Hamite) neighbours; but the race has been gradually displaced southwards to the Tsad basin, where their speech, fundamentally distinct from the Hamitic, has been adopted with considerable modifications by the Kanuri, Kanembu, and other true Negro peoples. Other large Negro groups are the Batta of Adamawa; the Nupe and Yoruba of the Lower Niger; the Mosu (Masa), south of Lake Tsad; the Maba of Wadai, the Dinka, Shilluk, Bari, and Monbuttu of the Upper Nile and Upper Welle; lastly, the Zande (Nyam-Nyam) and Fan, occupying most of the still unexplored region between Sudan and the Congo and Ogoway basins. All of these appear to be true Negroes, except the Fans, who have in recent times reached the west coast about the equator, and who are described as quite distinct (Hamites?) from the surrounding black populations (Burton, Lenz).

The remainder of North Africa, except where encroached upon by the intruding Semites (see above), is the proper domain of the Hamites—that is, the African branch of the Caucasian family. Their physical type is essentially Mediterranean, often characterised by extremely regular features, and in places even by blue eyes and fair complexion (Aures uplands, Algeria). But their language bears no distinct relation to any other Caucasian form of speech, beyond a certain faint resemblance to the Semitic sufficient to suggest a possible primeval Semitic-Hamitic organic tongue. It has a geographical range in the north analogous to that of the Bantu in the south, being spoken with great dialectic diversity by the Berbers (Imoshagh) in Western Sahara (Tuaregs), and Mauritania (Shlubs, Kabyles, Mazabs), and in the east by the Gallas, Somalis, Masai (?), Afars (Danakil), Agau, and Bejas that is, generally between the Nile basin and the east coast. But it is now extinct in Egypt, where Arabic is current, and where the old Hamitic speech is represented only by the liturgical language of the few surviving Christian Coptic communities.

In its inhabitants, as well as its natural history, Madagascar forms a region apart, the dominant Hovas of the central plateau, the Sakalavas of the west, and the Betsimisarakas of the east coast, being either of pure or mixed Malay stock. The Malagasy language also, which is spoken with a certain uniformity all over the island, is an outlying branch of the great oceanic (Malayo-Polynesian) family, which stretches thence eastwards to Easter Island. Nevertheless, there is evidently a considerable intermixture of black blood, due to the importation of slaves from the Mozambique coast, and possibly also to the presence of a Negro element in the island before the arrival of the Malayan intruders from the Eastern Archipelago.

The foregoing remarks will be rendered more intelligible by the subjoined general scheme of all the African races:

I.—NEGRO AND NEGROID PEOPLES.

Negritos (Pigmies) —	
Bushman (San).....	Kalahari Desert.
Batwas.....	Sankuru River, Congo Basin
Obongos.....	Ogoway Basin.
Akkas.....	South Monbuttoland.

NEGRO AND NEGROID PEOPLES—continued.

HOTTENTOTS (Khoi-Khoi).—

Namaqua.....Great and Little Namaqualand.
Korqua.....Upper Orange, Vaal, and Modder rivers.
Griqua (half-castes).....Griqualand West.

BANTUS—

Zulu-Kaffra, Basutos, Bechuanas.....South from the Limpopo.
Makua, Matebele.....Between Limpopo and Zambesi.
Mangaya, Waigana.....Lake Nyassa.
Bardos, Barot, Balundit.....Between Zambesi and Congo.
Waserihili, Wandat, Wayokono.....East Coast.
Wagunda, Wangenwesi, Walegga.....Equatorial Lakes.
Oncheero, Ocampo, Baongo, Batke, Duallo.....West Coast.

SENEGANESE NEGROES.—

Kru, Fanti, Ashanti, Yoruba, Nye.....Upper Guinea.
Mandingo, Wolof, Bambara, Souchi.....Senegambia.
Hausa, Fatta, Kanari, Bagirmi, Mosu.....
Kuncu.....Central Sudan.
Maba, Naba, Diaka, Shilluk, Turi, Monbutta, Zande.....Eastern Sudan.

II.—HAMITIC PEOPLES.

MIXED AND DOUBTFUL HAMITES.—

Faus.....Ogway Basin, thence inland.
Fulahs.....West and Central Sudan.
Tibbis.....East Sahara.
Abyssins.....Abyssinia.
Masai.....Masailand.
Feluhin.....Egypt.

TRUE HAMITES.—

Shluk.....Morocco.
Berbers { *Mozab, Kabyle*.....Algeria, Tunis.
 Tharier.....West Sahara.
Galus, Somali, Ahr (Danakil), Beys.....North-east Coast.

III.—SEMITIC PEOPLES.

Arabs.....Mauritania, West Sahara, Central and West Sudan.
Himyarites (Amhara, Tigre, Shoa).....Abyssinia.

Religion and Social Condition.—Speaking generally, the northern Hamites and Semites are Mohammedans and stock-breeders, the southern Bantus nature-worshippers and agriculturists; all these factors intermingling in the intervening zone of Sudan. The chief exceptions to this broad statement are the Christian Abyssinians (Monophysite sect); the Hottentots, who are mainly cattle-breeders; and the Algerian Berbers, who prefer tillage to pasturage. A nomad existence prevails in East Sudan; a settled, in Central and West Sudan. Throughout the whole of this region Islam continues to encroach on heathendom; it is now firmly seated on the Upper Niger and Upper Senegal; it has already penetrated to various points of the Senegambian and Guinea coasts; it has spread with the conquering Fulahs to the southern limits of Adami-awa, and has crept down the east coast from Somaliland to Zanzibar and Mozambique. Thus fully one half of the continent has accepted its tenets, which have on the whole had a beneficent influence on the Negro peoples, by developing a taste for clothing and other social comforts, by suppressing cannibalism, and shaking their faith in the medicine man. Elsewhere, progress is barred by the all-prevailing fetichism, intimately associated as that system is with the baneful practice of witchcraft. Cannibalism also in its most repulsive forms holds its ground among the Monbuttas, Zande, and Faus, a central zone of anthropophagy apparently traversing the continent from the west coast along the equator nearly to the great lakes, and stretching northwards to the Upper Shari basin. On the other hand, slavery, while maintained by Mohammedanism as a necessary social institution, has, by the intervention of the European powers, almost ceased to be an object of foreign traffic. The horrors of the 'middle passage' no longer vex the conscience of Christendom, and the Arab slaver has nearly disappeared from the Red Sea and Indian waters. But the Arab slave-dealer continues to widen his sphere of action in the interior, and has recently come into collision with the pioneers of European civilisation, towards the eastern frontier of the newly founded Congo State. Christianity has been introduced at various points of the periphery, and has made some progress

amongst the Basutos and some other Southern Bantus.

The political map of Africa has, during the last few years, undergone considerable modifications, due partly to wars and revolts in the extreme S. and N.E., but mainly to the rapid progress of exploration, which has reawakened the interest of European nations in this continent. A fresh stimulus was thus given to the desire of appropriating the territory still unoccupied in this region, with the result that at present nearly a fourth of Africa is under the direct or indirect control of seven European states—Great Britain, France, Portugal, Spain, Germany, Italy, and Turkey. The rest is either comprised in more or less clearly defined independent empires and kingdoms, or held by unruly predatory hordes, or by savage peoples still in the tribal state.

Great Britain holds: (1) Settlements at two points of the Senegambian coast (Gambia and Sierra Leone), and all along the Guinea coast, from the Assinie River to the Niger delta, and thence round to the Cameroons. (2) A now recognised protectorate over the Lower Niger and Benue, where the chartered African Trading Company possesses exclusive commercial privileges, and even exercises direct political influence over the surrounding native states. (3) The colonies of the Cape and Natal, with Griqualand West, and protectorates over Basutoland, Kafirland, Pondoland, and (since May 1887) all Zululand except what now belongs to the Boers, and (since March 1885 by treaty with Germany) over the whole of Bechuanaland, between the Boer States and 20° E. long. E. and W., with undefined northern limits towards Lake Ngami. (4) A protectorate (also by treaty with Germany, 1887) over the territory between Mount Kilima-Njaro and the Tana (Dana) River, giving permanent access from the east coast to Masai Land and the equatorial lake region. She has also formally annexed Socotra (1886), and in the meantime holds military occupation of Egypt.

France holds: (1) Algeria, to which Tunis has recently been practically annexed, making a compact territory between Morocco and Tripolitana, stretching from the Mediterranean southwards to about 30° N. lat. (2) The whole of the Senegal basin, from which her protectorate has now been extended eastwards to Sego on the Upper Niger, with a view to connecting this region with her Mediterranean possessions by a future Trans-Saharan railway. Since 1864, regular relations have been opened with the Kahia (hereditary mayor) of Timbuktu. (3) The Gaboon and Ogway basins, reaching by treaty (1885) with the Congo State southwards to the right bank of the Congo. (4) Obok, on Bah-el-Mandeb Strait, and Grand Bassam on the Gulf of Guinea.

Portugal holds her old possessions of Angola and Benguela, with a small tract just north of the Congo mouth on the west coast; and on the east, Mozambique, and dependencies between Cape Delagoa and Delagoa Bay, and along the right bank of the Zambesi to Tete. Spain claims on the mainland nothing but Ceuta, over against Gibraltar; a recently occupied strip of the NW. coast, between Capes Bojador and Blanco; Ifni, near Cape Nun and the district of the Muni and Naya rivers, north of the Gaboon. Germany, by the above-mentioned treaties with England, has acquired the coast-lands between Cape Frio and the Orange River (except the British territory of Walvisch Bay), extending inland to 20° E. long. (Bechuanaland); the Cameroons, at the head of the Gulf of Guinea; and on the east side, a protectorate over the region stretching from the Rovuma River, west from Zanzibar, northwards to Kilima-Njaro and the south end of Victoria

Nyanza. Italy has, since 1884, occupied the Red Sea coast from Massowah southwards to Assab; but her claim to this territory is disputed by Abyssinia, with which power she came into collision early in 1887. Turkey continues her suzerainty over Egypt, while retaining the Pashalik of Tripolitana with Fezzan—that is, the Mediterranean seaboard from Egypt to Tunis. But since the revolt of the Mahdī in Eastern Sudan, the Egyptian frontier has been withdrawn to Wady Halfa (second cataract of the Nile) in Lower Nubia. Thus the whole of Egyptian Sudan southwards to the equator and westwards to Wadai, reverts, at least temporarily, to the state of barbarism which prevailed in this region before its annexation to Egypt. Lastly, the Congo Free State, founded by the International Conference of Berlin, February 1885, and placed under the sovereignty of Leopold II., king of Belgium, and the joint protectorate of the European powers, comprises the Congo basin eastwards to Tanganyika, southwards to Lake Bangweolo, and northwards to about 4° N. lat., with a total area of over 1,000,000 sq. m. Several stations have already been established along the main stream, which, if maintained, will form so many centres of civilising influences for the surrounding Bantu populations.

Of the native states, the most important are: (1) Morocco, in the extreme NW., long threatened with disintegration, but held together by the mutual jealousy of Great Britain, France, and Spain. (2) The Abyssinian empire, embracing the Upper Bahr-el-Azraq and Takazzé basins, steadily advancing eastwards in search of an outlet on the Red Sea, and through the vassal state of Shoa penetrating southward into the Galla and Somali domains. (3) Wadai, a powerful sultanate between Dar-Fur and Lake Tsad, on which the neighbouring kingdom of Baghirmi is virtually dependent. (4) The former Haussa, now Fulah, states of Western Sudan, including the empire of Sokoto with Adamawa, and the kingdoms of Gando and Mossina (Massina) on the Niger. (5) Dahomey, the most powerful native state in Upper Guinea since the overthrow of Ashanti by the British (1874). (6) The sultanate of Zanzibar, whose claims to extensive jurisdiction inland to Tanganyika and Victoria Nyanza have been cut short by the treaty (1887) with Great Britain and Germany restricting its territory to the strip of coast, with adjacent islands, between Kipini and the Minunguni River (near Cape Delgado) N. and S., and extending only 10 miles inland—that is, to the new German protectorate (see above). (7) U-Ganda, a Bantu empire, ruling directly, or through vassals, over the north-western and northern shores of Victoria Nyanza. Mtesa, who at one time betrayed Christian proclivities, has been succeeded (1885) by Mwanga, whose avowed policy is to extirpate Christianity, tolerating the missionaries only for their skill in the arts and industries. (8) U-Rua and U-Lunda (the Munata Yanyvos), two vast Bantu states, with somewhat undefined limits, in the central regions between the Congo and Zambesi basins. (9) Matebele, a state of comparatively recent Zulu foundation, holding sway between the Limpopo and Zambesi.

To these may be added the two Boer states of Transvaal (now South African Republic) and Orange Free State, nearly encircled by the British and Portuguese possessions; with part of Zululand, also under the Boers. These, with Abyssinia, are Christian; the Zulu and three Bantu states, with Dahomey, are pagan; all the rest Mohammedan. The region held by the nomad predatory tribes is mainly the Sahara—Tuareg Hamites and Arabs in the west, Tibbu Hamites in the east. Of the lands under tribal organisation,

the most extensive appears to be that of the Zandebs (Nyam-Nyams), between the Upper Nile and Middle Congo.

Exploration.—The term 'Africa,' originally the name of a small tract on the north coast still surviving in the *Friga* of the Tunisian Tell, was extended under Roman influences to the whole of the 'dark continent,' just as the 'Asia' of the Cayster Valley in Ionia had under Greek influences been extended to the whole of the eastern world. It was the Ethiopia of Homeric, and the Libya of later Hellenic times, terms vaguely applied to the region stretching away to the setting sun, and with undefined southern limits. But neither Greeks nor Romans ever extended their knowledge much beyond the northern verge of the Sahara, and although the Nile Valley was the earliest seat of human culture, with stupendous monuments dating back 4000 years before the Christian era, Africa is still the least known division of the globe. Its exploration may be said to have begun with the expedition sent by Sankhara of the 11th (Theban) dynasty to the land of Punt (Somaliland), as recorded on the Wady Hammamat inscription (2400 B.C.), and after a lapse of over 4200 years, this work of exploration is still far from complete. After the circumnavigation attributed by Herodotus to Necho, son of Psametik I. (26th or Saïte dynasty, 620 B.C.), and the naval expedition of the Carthaginian Hanno round the north-west coast, perhaps to the equator (300 B.C.?), little was done for the seaboard till the 14th century A.D., when the Dieppe mariners claim to have founded 'Little Dieppe' on the Guinea coast (1364), and colonised the Canaries under Jean de Béthen-court, and when Italian navigators had coasted the north-west side as far as Bojador, as clearly shown on Marco Pizzigani's sketch map (1367), now in the Parma library. Our general knowledge of the periphery was nearly completed towards the close of the next century, when Vasco de Gama doubled the Cape and skirted the east coast northwards to Magadosho in 2° N. lat. (1497-98). But long before this, the spread of Islam in the 7th century, followed in the 11th (1050-78) by the tremendous irruption of nomad hordes from South-western Asia, had converted the greater part of the northern plains into an Arab domain, which was revealed to science by the Arab writers of the next ensuing centuries. Thus a fair knowledge was acquired of the geographical, political, and ethnological relations in the three physical zones of Maghreb (Mauritania), the Sahara, and Sudan by the works of Edrisi (12th century), Yakūt, Abul-Hassan, and Ibn-Said (13th century), Abul-Feda and Ibn-Batūta (14th century), Makrizi, Leo Africanus, and Ibn-Khaldūn (15th century), the true pioneers of African exploration. Then followed three hundred years of comparative inactivity, marked by no serious attempt to penetrate far into the interior, and noted chiefly by the occupation of various points on the coast by the Portuguese, Dutch, and English. The Portuguese established relations with the powerful Bantu states of Congo on the west, and Monomotopa on the south-east side; the Dutch obtained a firm footing in the Hottentot country in the extreme south, while the English were attracted more especially to Guinea and Senegambia (Windham's voyage to Guinea in the 16th century, followed by the journey of Jobson and Thomson, and occupation of Cape Coast in 1664).

But the modern epoch of geographical research, apart from political or commercial considerations, begins properly with James Bruce, who discovered the Abai source of the Blue Nile in 1770, and whose adventures in Abyssinia stimulated the foundation of the African Association (1788), which before the close of the 18th century had already sent out

Ledyard, Lucas, Houghton, and Mungo Park to explore the Niger basin.

In the 19th century, the most various motives have co-operated in favour of an extended knowledge of this vast continent. The captains of English cruisers employed to suppress the slave-trade have supplied some valuable information; the governors of the colonies and private merchants have contributed their share; and enterprising travellers from all sides of the coast have endeavoured to strike out paths to the interior. In 1802-5, Lichtenstein travelled in the district north of the Cape of Good Hope, and first furnished information regarding the Bechnana tribe. In 1809 Burekhardt was sent out by the African Society, and his explorations, rich in manifold results, occupied the years 1812-16. To the French we are indebted for much valuable information concerning Morocco, Algeria, and the neighbouring parts of Sahara. The labours of Oudney, Clapperton, Denham, and Lander, in the Sahara and Sudan are memorable by the discovery of Lake Tsud and the course of the Niger. Since about 1840, our knowledge of South Africa has received many important additions from the missionaries stationed there, especially Moffat; while David Livingstone, who from 1843 to 1873 was engaged in trying to open the countries north of the Cape of Good Hope, penetrated in 1849 as far as Lake Ngami, in 20° S. lat.; and in 1853, ascending the Leecambe (Zambesi) northward for several hundred miles, succeeded in crossing the continent to Loanda on the west coast. Having retraced his steps to the point of the Zambesi from which he had started, the adventurous traveller next followed that stream till he reached the east coast, at Quilimane, in 1856. From 1859 to 1863 was spent in various explorations of Lake Nyassa and the neighbouring regions. Again setting out in 1866, he found, in the region south of Lake Tanganyika, the river Chambezi. This river, which is specially known by this name ere it falls into Lake Bemba or Bangweolo, is known between that lake and Lake Moero as the Luapula, and farther on in its course as the Luabala; and was by Livingstone traced through these lakes and as far as 4° S. lat. Livingstone's belief was that this basin, now known to be the Upper Congo, contained the head-waters of the Nile. In 1871, along with Stanley, he found the river Rusizi flowing into the north of Lake Tanganyika. After some farther exploration of these regions, and new efforts to find the Nile sources, he died at Bala, beyond Lake Bemba, in May 1873. Burton and Speke, crossing the Border Mountains from Zanzibar, in 1857, discovered Lake Tanganyika; and the former then journeying to the N.E., discovered the southern part of the Great Victoria Nyanza, which he supposed to be the head reservoir of the Nile. A second expedition, undertaken by Speke and Grant in the end of 1860, penetrated as far north as Gondokoro on the White Nile, and added vastly to our knowledge of the eastern equatorial regions of Africa. At Gondokoro, Speke and Grant were met by Mr (afterwards Sir Samuel) Baker, who, accompanied by his heroic wife, pushed on to the south, and discovered in 1864, west of the Victoria, another great lake, which he called the Albert Nyanza. He returned in September 1873 from a second expedition—of a military character—undertaken in 1869, at the expense of the Pasha of Egypt, to suppress slavery in the upper regions of the Nile. The geography, language, and manners of the inhabitants of Abyssinia, Senaar, and Kordofan have also during late years been greatly illustrated by the efforts of various European travellers.

The researches of Dr Barth and his companions (1850-55) and Dr Gustav Nachtigal (1869-74)—

investigating the same central division of the continent as Clapperton and Denham—and Dr Schweinfurth's travels (1868-71) in unexplored regions, have enriched our store of knowledge regarding this land of mystery. In 1874-75 Lieutenant Cameron surveyed the lower half of Lake Tanganyika, and walked across tropical Africa from east to west; while H. M. Stanley, after exploring the Shimfyu, farthest southern head-stream of the Nile, circumnavigated Victoria Nyanza, and discovered the Mwtan Nzigé, which he took for Baker's Albert Nyanza, but which is now known to be a distinct basin draining possibly to Tanganyika (1875-76). Then striking the Luabala at Nyangwe in the end of 1876, he forced his way down the stream; and arriving at the mouth of the Congo in autumn 1877, demonstrated that the Luabala and the Congo are identical. In 1877-79 Serpa Pinto crossed from Benguela to Durban in Natal. In 1880 Mr Joseph Thomson explored the route between Nyassa and Tanganyika; and in 1884 he made his memorable journey from Mombasa by Kilima-Njaro and Kenia across Masai Land to the Victoria Nyanza. In 1884 Mr H. H. Johnston camped on Kilima-Njaro, and ascended the main peak to a height of 16,200 feet. Dr G. A. Fischer, in his attempt to relieve Emin Pasha, reached north to Lake Baringo (1885-86). In 1885 Grenfell discovered the U-banghi, the great northern tributary of the Congo, which he navigated to within 200 miles of the farthest point reached by Dr Junker (22° 40' E. long.), penetrating westward down the Welle-Makum (1886). It thus seems all but certain that Schweinfurth's Walle flows, not to Lake Tsud through the Shari, but through the U-banghi to the Congo.

In 1887 Emin Pasha reported by letter repeated exploration of the Albert Nyanza (q.v.). Meanwhile Stanley's expedition was on its way by the Congo to rescue him. The intricate water-system south of the Middle Congo has also been unravelled, especially by Pogge, Wissmann, and Ludwig Wolf (1881-86), who have made it evident that the Kwango, Kassai, Sankuru, and Lake Leopold all belong to one magnificent hydrographic system flowing through the Kwa to the Congo at Kwamouth, and including Livingstone's Kassabi (1854). It was on the Sankuru that Dr Wolf made the acquaintance of the pigmy Batwas, the smallest known race of mankind. The Ogoway system, first discovered by Du Chaillu (1850), ascended by Walker to Lope (1873), and surveyed by Compiègne and Marche to Ivindo (1874), has been completely elucidated by De Bazzza, Mizon, and Rouvier during various expeditions between 1877-86. The Alima, supposed to be one of its head streams, has been followed to the right bank of the Congo; and the Ogoway itself, reported to be one of the great continental basins, proves to be a coast stream of secondary importance. After visiting it in 1874, Dr Oscar Lenz transferred the scene of his operations to the north, crossing from Morocco to Timbuktu in 1880, and doing excellent surveying work on the route across the Western Sahara. The same route had been followed by Chaillié in 1828, himself preceded (1826) by Laing from Tripolitana, and followed by Barth (1853), these besides Mungo Park being the only European travellers that have reached the 'Queen of the Desert' during the present century. Again moving southwards, Lenz ascended the Congo to Nyangwe, and crossed the continent from the mouth of that river to the Zambesi delta in seventeen months (1885-86). He had been preceded altogether by nine others.

Livingstone, Loanda to Quilimane, 1854-56; Cameron, Zanzibar to Benguela, 1873-75; Stanley, Zanzibar to Natal, 1874-77; Serpa Pinto, Benguela to Natal, 1877-79; Matteucci and Massari,

Suakin to Niger delta, 1880-81; Wissmann, Loanda to Zanzibar coast, 1881-82; Arnot, Natal to Benguela, 1881-84; Capello and Ivens, Mossamedes to Zambesi delta, 1884-85; Glicerup, Congo mouth to Zanzibar, 1884-86.

These have all been routes from east to west or west to east, no one having yet succeeded in crossing the continent along the line of the meridian from north to south. In 1886 Dr Holub attempted the route from the Cape northwards, and in 1887 had penetrated farthest in this direction, having advanced some distance beyond the Zambesi. Meantime, although still numerous, and in some places extensive, the blank spaces on the map of Africa are being rapidly filled up, thanks partly to private enterprise, partly to the activity displayed by the officers in the service of the Congo Free State. The regions that still remain to be explored are chiefly: (1) The Upper Zambesi and the space between that river and the head-waters of the Congo—that is, both slopes of the Lokinga water parting. (2) The region between the Congo and equatorial lakes. (3) The much larger region between the Congo and Shari basins, and thence westwards to the Bight of Biafra. (4) Most of Somali, Kaffa, and Galla Lands, especially between Thomson and Fischer's farthest north and Schuyler's farthest south—that is, between 1-10° N. lat., and stretching from the Upper Nile to the Indian Ocean. (5) Much of the region inclosed by the great northern curve of the Niger. (6) The Libyan desert.

Besides the books of the above-mentioned explorers and travellers, see the works on Africa by Keith Johnston, Réclus, Hartmann, and others.

Africander, or **AFRIKANDER**, is a term for the descendants of European parents born in South Africa. The *Africander-Bond* is an association which became prominent in the Cape Colony after the Transvaal war; its aim being to consolidate and extend the political influence of the Dutch population in South Africa.

Afrīt, a powerful evil genie or demon in Mohammedan mythology.

Afzelius, ADAM, Swedish botanist, born 8th October 1750, became professor of Oriental Languages at Upsala, and in 1785 demonstrator in Botany there. He visited Sierra Leone in 1792, was for a time secretary of the Swedish Legation in London, and in 1812 became professor of Materia Medica at Upsala, where he died in 1837. As a pupil of Linnæus he edited his autobiography; and he wrote several works on the plants of the Guinea coast.

Agades, once a very important city of Central Africa, and still a great meeting-place of trading caravans, is the capital of the state Air or Ashen, south of the Sahara, and is built upon the eastern edge of a great tableland, at an elevation of not less than 2500 feet. In the 16th century it probably contained 60,000 inhabitants; now it has some 7000.

Agadir, the southernmost seaport town in Morocco, lies at the mouth of the Sâs, 23 miles SE. of Cape Ghir. Its harbour is the best on the coast, and it was once a place of importance; but a revolt in 1773, and the rise of Mogador in consequence, have lessened its value, and its pop. now does not exceed 1500.

Agalactia, or **AGALAXY** (Gr.), a want of the due secretion of milk. It may depend either on organic imperfection of the mammary gland, or upon constitutional causes. See MILK.

Agamemnon, son of King Atreus, and brother of Menelaus. After his father's death, he reigned in Mycenæ, and married Clytemnestra, by whom he had three children—Iphigenia, Electra, and Orestes.

When Paris, son of the Trojan king, Priam, carried off Helen, the wife of Menelaus, king of Lacedæmon, Agamemnon, with his injured brother, traversed Greece, exhorting all the leaders of the people to unite their forces in an expedition against Troy. Having gained their alliance, Agamemnon was appointed general-in-chief of the united forces assembled at Aulis in Boeotia, where they were delayed some time. In the *Iliad*, which gives an account of the war that followed, Agamemnon is described as a very stately and dignified figure. After the fall of Troy, he returned home, taking with him Cassandra, the daughter of Priam. Shortly afterwards, he was murdered by Clytemnestra, aided by Ægisthus, in whose care he had left his wife and children. A tragical fate had always lowered over the house of Agamemnon; and the destinies of his children—Iphigenia, Electra, and Orestes—were the favourite subjects of the three great Greek tragedians. See ÆSCHYLUS.

Agami, the common name of a genus of crane-like birds (*Psophia*), better known as Trumpeters (q.v.).

Agamidae, a family of squat-bodied, thick-tongued, terrestrial lizards, closely related to the Iguanas (q.v.). They frequent stony and sandy regions. Some measure a foot in length, but most of them are smaller. The skin is frequently beset with thorny scales. The Thorn-devil or Moloch of Australia, the smooth Egyptian form with loose inflatable skin and chameleon-like change of colour (*Trapelus Egyptianus*), the large Levantine Thorny-tailed Lizard (*Stellio spinipes*), and the Dabb of the Arabs (*Uromastix spinipes*), are common representatives of the family.

Agamogenesis, reproduction without sex, a process of multiplication by division, budding, &c., in which there is no union of sexual elements, but simply more or less discontinuous growth. It is exceedingly common among the lower animals and in plants, but is gradually replaced in the higher by the more specialised method of sexual reproduction. See PARTHENOGENESIS, REPRODUCTION, SEX.

Agapæ (Gr. *agapæ*, 'love') were love-feasts, or feasts of charity, originally celebrated by the early Christians in connection with the Lord's Supper. Wealthy or well-to-do Christians brought the materials of the feast, in which the poorer brethren who had nothing to bring shared equally. Prayers were said, hymns sung, and church business discussed; and the meetings closed with the 'holy kiss.' The agapæ long maintained something of the early Christian community of goods. Both the Lord's Supper and agapæ were at first celebrated in the evening; but during the persecutions, when the Christians had often to hold divine service before dawn, the Lord's Supper followed the morning service. Later, a formal separation was made between the two rites. In the 3d and 4th centuries, the agapæ had degenerated into a common banquet, where the deaths of relatives and the anniversaries of the martyrs were commemorated; and they ultimately became occasions of debauchery, or were suspected to be so by the heathen. Councils declared against them, forbade the clergy to take any share in their celebration, and finally banished them from the church. Some Protestant sects have instituted a kind of agapæ, tea-meetings with praise and prayer.

Agapem'one (Gr., 'love-abode'), a community of religious visionaries founded in 1830 at Charlinch, near Bridgewater, Somersetshire, by Henry James Prince, previously a clergyman of the Church of England. It is described in Hepworth Dixon's *Spiritual Wives* (1868).

Agar, a town of India, in the state of Gwalior, 41 miles NE. of Ujain. It stands in an open plain, 1598 feet above the sea. Pop. 30,000.

Agar-agar, the dried sliced stem of a seaweed, used in cookery under the name of Bengal or Japan isinglass. It resembles gelatine, but when made into jelly is less easily liquefied by heat, and is therefore much employed in the cultivation of microscopic fungi. See BACTERIA, GERM THEORY.

Agardh, KARL ADOLF, a Swedish botanist, was born 23d January 1785, studied at Lund, and in 1812 became professor of Botany there. He subsequently took orders, and died a bishop in 1859. In several great works on the alga, he laid the foundations of our present knowledge of these plants; and he wrote also on economics. His son, JAKOB GEORG, born 1813, became his successor in the chair at Lund (1854-1879), and continued his labours on the alga in a series of important works.

Agaric and Agaricus. See MUSHROOM.

Agassiz, JEAN LOUIS RODOLPHE, one of the most eminent naturalists of his time, was born at the village of Motier, in the canton of Fribourg, Switzerland, on the 28th day of May 1807. At ten years of age he was placed at a college for boys at Bienne, preparatory, as was then understood, to entering upon a mercantile life; but so marked an aptitude for the pursuit of natural history was manifested during his course here, that he was permitted to continue his studies at Lausanne and Zürich, and afterwards at the universities of Heidelberg and Munich, graduating in medicine at the latter institution in 1830.

Prior to his graduation, he prepared a description of the *Fishes of Brazil* (from specimens gathered by Spix, under the patronage of the king of Bavaria), which elicited a warm encomium from Cuvier, with whom he was afterwards associated on terms of intimacy. Near the close of 1831 he repaired to Paris to pursue his investigations at the Museum of Natural History, where, receiving some pecuniary assistance from Baron Humboldt, he was enabled to remain until the autumn of 1832, when he accepted a professorship at Neuchâtel. In 1833 he commenced the publication of his *Researches on the Fossil Fishes*, which the following year brought him from London the Wollaston prize. In 1834 he visited England for the first time, where he was warmly welcomed, and in 1836 commenced an examination of the glacial phenomena of the Alps, his theory of which subsequently found expression in his *Études sur les Glaciers* (1840), and in his *Système Glaciaire* (1847). In 1839 he published a *Natural History of the Fresh-water Fishes of Central Europe*.

In the summer of 1840 Agassiz established a station of observation on the Alps (where, with a corps of assistants, he spent each summer until 1844), and in the following autumn he visited the Scottish Highlands, with gratifying results, additional evidence in support of his glacial theory.

In October 1846 Agassiz went to America, and delivered in Boston a course of lectures *On the Plan of the Creation*. These at once established his reputation as a popular lecturer, and during the winters of 1847 and 1848 he lectured in the principal cities of the United States, everywhere with success. In 1848 he was elected to the chair of Natural History in the Lawrence Scientific School at Harvard University, and in the summer of that year, in company with a class of students, made a scientific expedition to the northern shores of Lake Superior. At the invitation of Professor Barbo, Superintendent of the United States Coast

expedition to the Florida Reefs, his report upon which was afterwards published in the *Memoirs of the Museum of Comparative Zoology*. In 1851, in addition to his work at Cambridge, he accepted a professorship at the Medical College of Charleston, South Carolina, where he spent the following winter, and in the spring delivered a course of lectures at Washington, before the Smithsonian Institution, of which he was soon appointed a Regent. In 1854 he was invited to a chair in the university of Zürich, Switzerland, which he declined, and the following year, assisted by his daughters, he established at Cambridge a young ladies' school, which was continued for eight years, until closed in consequence of the civil war. Meanwhile, Agassiz had planned an important work, *Contributions to the Natural History of the United States*, to be published in ten 4to vols., of which he lived to issue only four. He declined the chair of Palaeontology in the Museum of Natural History at Paris, in 1857, receiving soon after the Order of the Legion of Honour from the French emperor.

By the death of Mr Francis C. Gray of Boston, in 1858, a bequest of \$50,000 was received for the establishment of a Museum of Comparative Zoology at Harvard, to which the state of Massachusetts added a grant of \$100,000 in lands; and the sum of \$75,000 was contributed by private individuals. Agassiz giving all his collections, which represented a pecuniary outlay of \$10,000.

Three or four years of incessant though otherwise uneventful work in connection with this museum so undermined his health, that he decided upon a trip to Brazil; but his intentions becoming known, funds were raised, a corps of assistants was organised, and the 'quiet trip' at first contemplated was transformed into one of the most important scientific expeditions of Agassiz's whole life. After an absence of sixteen months, he returned to the United States, the account of his trip, as prepared by his wife, being published under the title of *A Journey in Brazil*, by Professor and Mrs Louis Agassiz. In 1872 he visited California, and in the following year received from Mr John Anderson of New York, as a site for a summer school of Natural History, the island of Penikese in Buzzard's Bay, on the Massachusetts coast, and a money endowment of \$50,000. He lived to organise and conduct this unique school for one season only, and died at his home in Cambridge, December 14, 1873. See *Louis Agassiz: His Life and Correspondence*, edited by Elizabeth Cary Agassiz (2 vols. 1886).

His son, ALEXANDER, born at Neuchâtel, 17th December 1835, became connected with the Harvard Museum in 1859. He amassed a fortune in the copper-mines of Lake Superior, and returning to the museum in 1871, became curator on his father's death in 1873, but retired in 1885. He has engaged extensively in deep-sea dredging; founded the zoological station at Newport, Rhode Island; and has written works on the embryology of the star-fishes, the flounders, and the ctenophora, and numerous contributions to scientific journals in various departments of zoology.

Agate, a mineral composed of layers of quartz, generally of different varieties of colours, intimately joined together. It usually occurs as rounded nodules or veins in trap rock. The layers are often concentric, and in the section sometimes appear nearly circular. The composition varies greatly, but silica is always predominant, usually with alumina and oxide of iron. Chalcedony (q.v.) carnelian, amethyst, common quartz, jasper, opal, and flint occur as layers in agate, and are spoken of as kinds of agate. There are also clouded agates, star-agates, moss-agates, &c., so called from their

appearance. It takes a fine polish, and is much used for ornamental purposes. Many agates are found in Scotland, and are sold under the name of *Scotch Pebbles*.

Agatha, ST., a noble Sicilian lady of great beauty, who rejected the love of the Prefect Quintilianus, and suffered a cruel martyrdom in the persecution of Christians under Decius (251). She holds a high rank among the saints of the Roman Catholic Church; her festival falls February 5.

Agathocles, Tyrant of Syracuse, was born at Therma, in Sicily, in 361 B.C. As leader of the popular party in Syracuse, he was twice driven into exile, but ultimately made himself autocrat of Syracuse, after a massacre of several thousands of citizens, 317 B.C. Having failed in an attempt to expel the Carthaginians from Sicily, he passed over to Africa, and attacked them there. This war he carried on with success for four years, or until 307 B.C., when he suffered a serious defeat, and basely abandoning his troops to the enemy, escaped safely into Sicily. There, by fraud and bloodshed, he soon recovered his former power; but in 289 B.C. one of his favourites destroyed him by means of a poisoned toothpick.

Agavé, a genus of plants of remarkable and beautiful appearance, belonging to the natural order Amaryllidaceæ (q.v.). There are a number of species, all natives of Mexico and Central America. They are often popularly confounded with Aloes (q.v.); and *Agave americana* is generally known by the name of American Aloe. The agaves have



American Aloe (*Agave americana*).

either no proper stem, or a very short one bearing at its summit a crowded head of large, fleshy leaves, which are spiny at the margin. From the midst of these shoots up the straight, upright scape, 24 to 36 feet high, and at the base often 1 foot in diameter, along which are small, appressed, lanceolate bractes, with a terminal panicle, often bearing as many as 4000 flowers. In Mexico, these plants usually flower in the seventh and eighth, sometimes even fifth or sixth year, and even in poor soils or exposed situations seldom later than the twelfth year, but in our hothouses not until they have reached a very advanced age (40-60 years); whence arises the gardeners' fable of their flowering only once in one hundred years. After flowering, the plant always dies down to the ground, but new plants arise from lateral buds. The best known species is *Agave americana*, which was first brought to Spain in 1561, and being easily propagated by

cuttings, is employed for fences in Italian Switzerland, and has become naturalised in Naples, Sicily, Greece, and the north of Africa. By maceration of the leaves, which are 5 to 7 feet long, are obtained coarse fibres, which are used under the name of *maguey*, for the manufacture of thread, twine, ropes, hammocks, &c. This fibre is also known as Pita Flax. It is now produced to some extent in the south of Europe. It is not very strong nor durable, and if exposed to moisture it soon decays. The ancient Mexicans employed it for the preparation of a coarse kind of paper, and the Indians use it for oakum. The leaves, cut into slices, are used for feeding cattle. When the young flower-bud has been cut out, the sap continues to flow into the cavity for a considerable time. This is termed *aguamiel*, and contains a considerable amount of sugar. It is collected daily, and after rapid fermentation furnishes the national beverage called *pulque*. This is milky, sour, and ill-smelling, resembling thin buttermilk, and strongly recalling the flavour of rotten eggs; yet even Europeans soon find it agreeable and refreshing. In large quantities it produces a dull intoxication followed by heavy sleep. The strong spirit of the country (*aguardiente*) is also distilled from it. *Agave americana*, *Agave mexicana*, and other species are extensively cultivated for these purposes. The roots of *Agave saponaria* are used in Mexico for washing, being a powerful detergent.

Agde, an ancient French town in the department of Hérault, situated about 3 miles from the Mediterranean Sea, on the left bank of a navigable stream, the mouth of which forms a harbour. It has a brisk coast-trade, while it is also the entrepôt for the traffic of the south and west of France. It stands on the lava from an extinct volcano, and is the ancient *Agatha Narbonensis*, originally a Greek colony. Pop. (1881) 7728.

Age is used specially to denote certain long periods in the history of the human race or of human civilisation. The idea of a succession of ages presented itself at a very early period to the Greek mind. The life of the race was likened to that of the individual—hence the infancy of the race might easily be imagined to be the most beautiful and serene of all. Hesiod mentions five ages—the golden, simple and patriarchal; the silver, voluptuous and godless; the brazen, warlike, wild, and violent; the heroic, an aspiration towards the better; the iron, in which justice, piety, and faithfulness had vanished from the earth, the time in which Hesiod fancied that he himself lived. Ovid imitates him, but omits the heroic age. This idea, at first perhaps a mere poetic comparison, gradually worked its way into prose. These ages were regarded as the divisions of the great world-year, which would be completed when the stars and planets had performed a revolution round the heavens, after which destiny would repeat itself in the same series of events. The golden age was said to be governed by Saturn; the silver, by Jupiter; the brazen, by Neptune; and the iron, by Pluto. The geological ages or periods will be found discussed at GEOLOGY; while the stone, bronze, and iron ages which archaeological research accepts, are treated at ARCHAEOLOGY. The *Middle Ages*, so called as intervening between classical antiquity and modern times, have a separate article. The *Dark Ages*, nearly coinciding in time, refer to the period of intellectual darkness from the decline of classical learning, after the establishment of the barbarians in Europe in the 5th century, till the Renaissance (q.v.) in the 15th century. Modern philosophical speculation has also attempted to divide human history into definite ages or periods.

Fichte numbers five, of which he conceives that we are in the third; Hegel (q.v.) and Auguste Comte reckon three (see POSITIVISM). The word Age is also very familiar in such phrases as the Augustan Age, the Elizabethan Age, the Age of Queen Anne, &c. In the life of an individual, it is usual to speak of four ages—infancy, youth, manhood, and old age; though some physiologists (like Shakespeare in *As You Like It*) count seven—infancy, childhood, boyhood or girlhood, adolescence, manhood or womanhood, age, and old age. See LONGEVITY.

Age. The legal divisions of human life, being sometimes arbitrary, and sometimes founded on nature, differ considerably in different countries. In England, the whole period previous to twenty-one years of age is usually spoken of as *infancy*, a term which has a totally different signification in those countries that have followed the civil law. But notwithstanding this general division, which is common to both sexes, the ages of male and female are different for different purposes. Thus, a boy of fourteen, a girl of twelve, may validly consent to marry. Infancy, generally, is for the protection of civil rights; and by a statute of 1874 it is declared that all contracts made by an infant, except those for necessities, are absolutely void. In the Probate Court, an infant above the age of seven is called a minor, and is allowed to choose a guardian for himself, but no infant can make a valid will. In criminal law, a child under seven years is incapable of felony, and up to the age of fourteen there is a presumption against the existence of a criminal mind and intention; but infants between fourteen and twenty-one are fully responsible for criminal acts.

By the law of Scotland, again, life is divided into three periods—*pupilarity*, *minority*, and *majority*. The first extends from birth to the age of legal puberty, which is fourteen in males and twelve in females, at which ages they may respectively marry; the second embraces the period from the termination of pupilarity till the attainment of majority, which takes place at the age of twenty-one in both sexes; and the third includes the whole of after-life. The term Minority, however, is often applied to the whole period anterior to majority, and is thus equivalent to infancy or nonage in England. Infancy in Scotland can scarcely be said to possess a technical meaning; but when used at all, it is always in the sense of the Roman *infantia*, to indicate the period from birth till seven years of age, during which a child, unless in very unusual circumstances, is intrusted to the care of the mother. The office of *tutary* corresponds in duration to pupilarity, that of *curator* to minority (see TUTOR, GUARDIAN). The civil capacity and responsibility of minors in Scotland are more extensive than, and totally different in principle from those of infants in England. As regards children under seven, the same doctrine of criminal responsibility prevails as in England; but in the case of pupils between seven and fourteen, the Scottish law, although ill defined, inclines to greater severity in principle. The British laws on the subject are obviously unreasonable, and are not founded on any physiological basis. As regards capacity for giving evidence in court, the judges have been left to proceed on grounds of common sense, and no serious injustice is done. In France, the marriageable age is eighteen in males and fifteen in females, an arrangement more reasonable than that which we have borrowed from the Romans, and which, however suitable it may have been to the climate of Italy, could never have been free from inconveniences in this country. Twenty-one is generally the age at which men are eligible for public offices; and at this age they may elect, and be elected members of

parliament. But a man must be twenty-four before he can be admitted to priests' orders in the English Church, and thirty before he can be a bishop.

In the United States, full age is the day preceding the twenty-first anniversary of a person's birth. All persons under seven years of age are incapable of crime; and between the ages of seven and fourteen the legal presumption is they are not capable of crime, but this assumption may be rebutted by strong and clear proof of a mischievous discretion or knowledge of the wrong. The presumptions of innocence cease at the age of fourteen, at which time males may choose their own guardian, and at eighteen may enlist in the army. Females are supposed to arrive at discretion at twelve years of age, and may consent to marriage, and at fourteen choose their own guardian. In some of the states they become of full age at eighteen. A male may vote at twenty-one, be elected a representative to congress at twenty-five, and a senator of the United States at thirty.

The legal disabilities attaching to the different stages of minority, or, to speak more correctly, the privileges which the law confers on minors for their protection, will be treated of under the different subjects to which they relate (see CONSENT, CONTRACT, CRIME, GUARDIAN, INFANT, MARRIAGE). The problem of age is one of the most interesting in medical jurisprudence. The most reliable evidence afforded by the skeleton is that connected with the teeth, the skull, and the general character of the bony attachments.

Agen, the chief town of the French department of Lot-et-Garonne, is situated in a fertile region on the right bank of the Garonne, 84 miles SE. of Bordeaux. The town is old and gloomy in appearance; it carries on an active trade in woollen and linen fabrics, leather, coloured paper, colours, cordage, and sailcloth; and is an important railway centre. Here Joseph Scaliger was born. It has often been exposed to the miseries of war at the hands of Goths, Huns, English, and Huguenots. Pop. (1881) 18,743.

Agent is one who is authorised or delegated to transact business for another (who in this relation is called his principal or constituent) in whose place he comes, and who is bound by his acts in the business to which the agency extends. In Roman law, this was the gratuitous contract of mandate, but the modern factor almost invariably works for hire. Even where gratuitous, the mandatary is of course bound to account for his intrusions, and entitled to do what is necessary for executing his instructions, and to reimbursement of his advances and relief of his engagements. The appointment of a mercantile agent may either be *general*, which is the common case of an agent for a foreign merchant, the agent being generally liable for all orders given on account of his principal, because it is improbable that credit will be given to a foreigner; or *special*, which is confined to a particular line of business. The most common kinds of special agents are brokers, stockbrokers, ship-brokers, insurance-brokers, supercargoes, ship-husbands, procurators to draw or accept bills, wharfingers, travellers or riders, bank-agents, and law-agents. In all these cases the powers and liabilities of an agent are fairly well fixed by mercantile custom and understanding, or in some cases by a written authority which is exhibited.

Third parties dealing with an agent are not concerned with unusual restrictions placed upon his authority. The agent is bound to carry out with care the instructions given. He is not liable for the solvency of customers, unless he has accepted a *del credere* commission. He must obtain the consent of his principal to his dealings on his own

account in the business of the agency. His remittances should be through a bank of good reputation, and if he pays into his own account he is liable for the amount. If the principal is not named when the contract is made, the agent is personally bound as well as the principal; but if the principal is named, or otherwise known, *prima facie* the agent undertakes no liability to the customer. In the former case, of course, the customer may insist on a settlement of his separate account with the agent. The customer may, and does frequently, elect to deal only with the principal after he is discovered, and in such cases the agent no longer remains liable. Principals are generally liable for the fraud and misrepresentation of an agent committed in the line of the business. Factors have power to sell and pledge goods for advance, but no general power to borrow on the credit of the principal, or to grant any obligation outside the ordinary course of business. In Diplomacy it is essential to distinguish between those agents, such as ambassadors, &c. who have the right of embassy, including inviolability of person and house, and agents sent merely to negotiate a loan, or to mark a boundary.

In the United States an agency may be created by deed, in writing not by deed, or by verbal delegation of authority. It may be implied from the relation and acts of the parties and the nature of the employment, without any express appointment. When the authority extends to all acts connected with a particular business, it is called *general*; but when confined to a single act, it is called *special*. The agency may terminate by revocation of the power conferred. A person cannot act as agent in a transaction wherein he has an adverse interest or employment. The death of either principal or agent terminates the agency. For the duties of consular agent, see CONSUL.

Agent and Client. The employer of a law-agent is entitled to presume that he is possessed of competent professional knowledge, and the agent is consequently responsible to his client for the consequences of want of reasonable care and skill, or gross ignorance in the conduct of the business intrusted to him, as in not duly negotiating a bill, using a wrong stamp, taking an informal security. He does not guarantee that his advice shall be correct. Every gift by a client to his agent is void, unless subsequently confirmed by the client. The gift falls, therefore, if the client dies without confirming it. No one is entitled to suppose that a law-agent has a general authority to bind his client, but he is entitled to conduct, and probably even to compromise, a litigation. See SOLICITOR, WRITER TO THE SIGNET.

Agésilas, king of Sparta (397-360 B.C.), was elevated to the throne chiefly by the exertions of Lysander. He was one of the most brilliant soldiers of antiquity. Being called upon by the Ionians to assist them against Artaxerxes, he commenced a splendid campaign in Asia; but was compelled by the Corinthian war, in which several of the Grecian states were allied against Sparta, to leave his conquest over the Persians incomplete, and return to Greece. At Coronæa (394 B.C.), he gained a victory over the allied forces, and in 378 the war was concluded by a treaty of peace in favour of Sparta. Afterwards, in the Theban war, though hard pressed by Pelopidas and Epaminondas, and defeated at Mantinea (362), he bravely and ably defended his country. He fought a campaign in Egypt, and returning, he died in his 84th year.

Agglomerate, or VOLCANIC AGGLOMERATE, is a rock made up of a confused mass of angular and subangular blocks of all sizes. The blocks

may consist exclusively of igneous rocks, or of sedimentary rocks, or of both, set in a more or less meagre matrix of finer-grained detritus of the same materials. The rock is of volcanic origin, and is frequently found in Scotland filling up vertical holes or pipes which seem to have been the throats or necks of ancient volcanoes.

Agglutinative Language. See PHILOLOGY.

Aghrim, a hill in Galway, Ireland, 30 miles SW. of Athlone. Here, on 12th July 1691, Ginkell defeated the French and Irish adherents of James II. under St Ruth.

Agin-court, now AZINCOURT, a small village in the centre of the French department of Pas-de-Calais, celebrated for a bloody battle between the English and French, October 25, 1415. The internal distractions of France under the imbecile Charles VI. had encouraged England to attempt to make good her ancient claims. Henry V. of England had landed at Harfleur, had taken that fortress, and was marching to Calais, in order to go into winter-quarters. But a French army, vastly superior in number, intercepted the English march to Calais, near the village of Agincourt. The invading army, weakened in numbers and suffering from want of provisions, was still 14,000 strong; the French, under the Constable D'Albret, numbered 50,000 or more. The battle lasted three hours, and was a signal victory for the English, due mainly to the archers. As many as 10,000 Frenchmen are said to have fallen, among whom were the Constable, three dukes, and ninety barons. Five princes, among them the Dukes of Orleans and Bourbon, were taken prisoners. The English lost 1600 killed.

Agio, an Italian word, is used, generally in connection with continental exchanges, to denote the difference between the real and the nominal value of money, or between coin and paper money; also the variations from fixed pars or rates of exchange. It sometimes also corresponds very nearly to the English word 'premium.' See EXCHANGE.

Agis, the name of several kings of Sparta, of whom the most noted was Agis IV. He came to the throne in 244 B.C., when the state of Sparta had fallen into a ruinous condition through long-continued war. The riches of the state were in the hands of a few persons, while a great majority of the people were in extreme indigence. Agis, therefore, in accordance with the old laws of the state, proposed the increase of the number of citizens by the admission of a certain number of Helots and aliens, to be followed by the redistribution of landed estates by lottery. But insuperable difficulties were thrown in the way; the people were persuaded that his schemes were inimical to the welfare of the state; and Agis was put to death by strangulation (241 B.C.).

Agna'no, till 1870 a small lake 3 miles west of Naples, about 60 feet in depth, and without visible outlet. As it caused malaria, it has been drained. The surrounding country is volcanic and mountainous. On the right lies the *Grotta del Cane* (q.v.), and on the left are found the sulphurous vapour-baths of *San Germano*.

Agnate (Lat. *agnatus*). Agnates, in the law both of England and Scotland, are persons related through the father, as cognates are persons related through the mother. In the Roman law, both of these terms had a somewhat different signification. Agnates, by that system, were persons related through males only, whilst cognates were all those in whose connection, links on the father's side, one or more female links intervened. Thus, a brother's son was his uncle's agnate, because the

propinquity was wholly by males; a sister's son was his cognate, because a female was interposed in that relationship. With us the intervention of females is immaterial, provided the connection be on the male, or paternal, side of the house. The cause of our having thus changed the meaning of terms manifestly borrowed from the Roman law, seems to be that in Rome the distinction between agnates and cognates was founded on an institution which has not been adopted in the Roman sense by any modern nation—that, namely, of the *Patria potestas* (q.v.). Roman agnati are defined by Hugo to be all those who either were actually under the same *paterfamilias*, or would have been so had he been alive; and thus it was that, as no one could belong to two different families at the same time, the agnation to the original family was destroyed, and a new agnation created, not only by marriage, but by Adoption (q.v.). The foundation of cognation, again, was a legal marriage. All who could trace up their origin to the same marriage were *cognati*; and thus the term *cognatus*, generally speaking, comprehended *agnatus*. But though an *agnatus* was thus almost always a *cognatus*, a *cognatus* was an *agnatus* only when his relationship by blood was traceable through males. Justinian abolished entirely the distinction between agnates and cognates. In the United States, the word *agnate* is obsolete, the distinction between the male and female lines of descent not being recognised. See SUCCESSION, GUARDIAN.

Agnes, St., according to legend, was a beautiful Roman Christian in the time of Diocletian, who, having in her thirteenth year refused the heathen son of the pretor, was exposed in a public brothel. The miraculous growth of her hair, the blinding of the pretor's son, his restoration to sight, and the refusal of the flames to touch her—all could not save her from the executioner's sword. Her festival falls on January 21, and her symbol is a lamb. See PALLIUM.

Agnesi, MARIA GAETANA, a woman remarkable for her varied attainments, was born at Milan in 1718. In her ninth year she could converse in Latin, and soon acquired a mastery of Greek, Hebrew, French, Spanish, and German. Her father invited parties of learned men to his house, with whom, in spite of her retiring disposition, Maria disputed on philosophical points. Of her discourses on these occasions, her father published specimens, called *Propositiones Philosophicæ* (1738). After her twentieth year, she devoted herself to the study of mathematics, wrote an unpublished treatise on Conic Sections, and published her *Istituzioni Analitiche* (1748). The latter was a work of permanent value, and was translated into French and English. When her father was disabled by infirmity, she took his place as professor of Mathematics in the university of Bologna, by the appointment of Pope Benedict XIV. After her father's death in 1752, she made theology her study, and ultimately entered a convent at Milan, where in 1799 she died at the good old age of 81.

Agni, Indian god of fire. See INDIA (Religions).

Agnoñé, a town of South Italy, 22 miles NW. of Canipobasso. It is noted for its copper and steel manufactures. Pop. 61'9.

Agnosticism, a word introduced into the English language by Professor Huxley, in 1869. The term was suggested to him by the inscription, *Agnoŏto Theo* ('To an Unknown God'), which the apostle Paul saw on an Athenian altar, as recorded in Acts, xvii. 23. It signifies the doctrine that man does not know anything about spiritual existences, whether divine or human, or about a future life. The advocates

of agnosticism employ two methods of argumentation in support of their position—viz. the *sceptical* and the *critical*. In their reasoning against spiritualism, they are careful to guard themselves against the charge of positive Atheism (q.v.) on the one hand, and of philosophical Materialism (q.v.) on the other. They frankly admit that there is more than matter and force in the universe. The phenomena of consciousness and mental activity cannot, they grant, be put in the same category with the properties of matter. With the former, they admit, physical science cannot deal. 'The passage,' says Professor Tyndall, 'from the physics of the brain to the corresponding facts of consciousness is unthinkable.' Consciousness, they assert, is a function of the brain, as motion is a function of the muscles. As to *how* the stimulation of a sensory nerve gives rise to consciousness, or the stimulation of a motor nerve to muscular contraction, they avow blank ignorance. *Perhaps*, they say, consciousness inheres in a substance other than material; and *perhaps* the series of conscious states, at present associated with man's material organism, *may* continue to exist apart from it; but these things they do not profess to know. As regards the existence of a God, they say that, having regard to the universality of the law of causation, they cannot refuse to admit an eternal existence, and that, in view of the doctrine of the conservation of energy, they must also grant the *possibility* of an eternal energy. Further, if the existence of material phenomena in the form of consciousness is admitted, an eternal series of such phenomena must be regarded as *possible*. Thus, an eternal existence possessed of consciousness and energy *may be* the First Cause of all things. Agnosticism, however, leaves it an open question whether energy is eternal *a parte ante*; and as to consciousness it maintains that there is no positive evidence that the first cause possesses it at all. The only thing certain, accordingly, is that an eternal existence of some sort must be postulated. Though their belief in the universality of the law of causation shuts them in to this positive conclusion, at the same time agnostics are careful to state that causation cannot be proved by any amount of experience—thus following Hume and Kant, who taught that our only knowledge is of phenomena or sequences. 'The only meaning,' says Professor Huxley, 'of the law of causation in the physical world, is that it generalises universal experience of the order of the world; and if experience shows [and he says it does] a similar order to obtain among states of consciousness, the law of causation will properly express that order' (*Life of Hume*, pp. 184-5). 'Universal experience' of the 'order' of phenomena is, according to this statement, all that is meant by the law of causation. *Why* phenomena fall into this order, the agnostic does not profess to know. This being so, it follows that, as it is only in consciousness we apprehend phenomena, agnosticism leaves it problematical whether an external world exists at all. *Perhaps* the Idealism of Berkeley (q.v.) is the soundest philosophy. Or, linking human consciousness to a possible eternal series of conscious states, it *may be* that the Pantheism of Spinoza (q.v.) is the most satisfactory solution of the mystery of existence. Owing to the reverence of agnostics for the law of causation, they repudiate the ascription to man of free-will, as ordinarily understood. Agnosticism may be regarded as Positivism without its dogmatism. See POSITIVISM, SPENCER.

Agnus Dei (Lat., 'Lamb of God'), one of the titles of Christ (John, i. 29); also the name given to a prayer used in the Roman Catholic service of Mass: 'O Lamb of God, that takest away the sins of the world, have mercy upon us.' In the mus-

reference it is the sixth or last section of the Mass. The figure of a lamb bearing a cross, stamped upon a disc of wax, silver, or gold, is also styled an *Agnus Dei*. Such medals have been consecrated by the popes, in certain years of their pontificate, since the 14th century, for distribution among the faithful at Easter, and were worn as amulets. The lamb bearing the banner of the cross is used frequently as a symbol of Christ, in stained glass, in sculpture, and even on inn-signs.

Agonic Line (Gr., 'without angle') is the line of no magnetic variation; an irregular line passing through the magnetic poles of the earth, along which the magnetic needle points directly north or south. See MAGNETISM.

Ag'ora, the public square and market-place of an ancient Greek town, corresponding to the *forum* of the Romans. In most of the cities it was the scene of public meetings for social or political purposes. The name was also applied to the general assemblies of the people in the early Greek states, usually convoked by the king or by some distinguished chieftain, as by Achilles before Troy.

Agouti, MARIE DE FLAVIGNY, COMTESSE D', a French author known under the literary pseudonym of 'Daniel Stern,' was born at Frankfort, 31st December 1805, and educated at a convent in Paris. She married the Comte d'Agouti in 1827, but left him and formed a connection with Liszt. To him she bore three daughters, the eldest of whom married Emile Ollivier; the second, Guy de Charnacé; and the third, first Hans von Bülow, and afterwards Richard Wagner. Amongst 'Daniel Stern's' works are the half-autobiographic romance *Nélida*, *Lettres Républicaines*, *Histoire de la Révolution de 1848*, and *Mes Souvenirs*, 1896-33. Her *Esquisses morales* (1849) is admittedly her best work. She died in Paris, 5th March 1876.

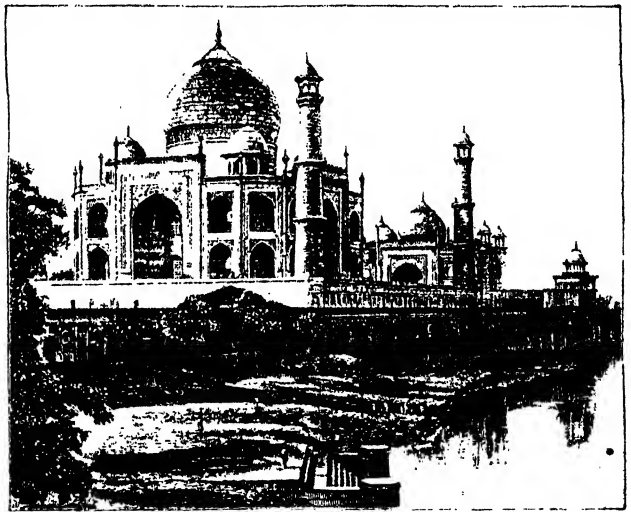
Agouti (*Dasyprocta agouti*), a small South American rodent allied to the guinea-pig. The colour of its coarse hair varies from brown to yellow; the form is compact; the legs are slender and pig-like, with three toes on the hind-feet; the ears small and rounded; the tail rudimentary. The agouti lives in the forests of Guiana, Brazil, and Peru, and makes its home at the foot of trees. It is active and



Agouti (*Dasyprocta agouti*).

agile in its habits, and wanders in search of food into the plains, where it often does much damage to sugar plantations and the like. It is said to be tameable, and seems to live somewhat isolated. Farther south, this form is represented by Azara's agouti (*D. azara*), and in the north, by a smaller form, the *acouchy* (*D. acouchy*).

Agra, a city in the North-western Provinces of India, situated on the right bank of the Jumna, 139 miles SE. of Delhi by rail, and 841 NW. of Calcutta. The ancient walls of the city embraced an area of about 11 square miles, of which about one-half is now occupied. The houses are for the most part built of red sandstone, and, on the whole, Agra is the handsomest city in Upper India. Some of the public buildings, monuments of the house of Timur, are on a scale of striking magnificence. Among these are the fortress built by Akbar, within the walls of which are the palace and audience-hall of Shah Jehan, the Moti Masjid or Pearl Mosque, so called for its surpassing architectural beauty, and the Jama Masjid or Great Mosque. Still more celebrated is the Taj Mahal, situated without the city, about a mile to the east of the fort. This extraordinary and beautiful mausoleum was built by the Emperor Shah Jehan for himself and his



The Taj Mahal.
From a photograph by FRITH

favourite wife, who died in 1629; and 20,000 men were employed incessantly on it for twenty-two years. The complexity and grace of the general design, and the elaborate perfection of the workmanship, are alike remarkable. The main features of the building are the mausoleum in the centre, on a raised platform, surmounted by a beautiful dome, with smaller domes at each corner, and four graceful minarets (133 feet high). The principal parts of the building are constructed of white marble; and the mosaic work of the interior is singularly rich and beautiful. Of British edifices in and near the city, the principal are the Government House, the Government College, three missionary colleges, the English church, and the barracks. The climate at Agra, during the hot and rainy seasons (April to September), is very injurious to Europeans; but the average health of the city is equal to that of any other station in the North-western Provinces. Agra is fortified and has a garrison; there is a military station in the neighbourhood of the city. The principal articles of trade are cotton, tobacco, salt, grain, and sugar. There are manufactures of shoes, pipe stems, and gold lace, and of inlaid mosaic work, for which Agra is famous. It is a very important railway centre, and has many claims to be regarded as the commercial capital

of the North-west. Pop. (1881) 160,203, of whom 44,000 are Mohammedans.

This city is held in great veneration by the Hindus, as the scene of the incarnation of Vishnu under the name of Parasu Rama. It first rose to importance in the beginning of the 16th century, and till 1658 was the capital of the Mogul sovereigns. In that year Aurangzebe removed to Delhi; henceforth Agra declined. It was taken in 1784 by Sindhia, and surrendered in 1803 to Lord Lake. From 1835 till 1862, Agra was the seat of government for the North-west Provinces. During the mutiny the Europeans had, in June 1857, to abandon the city and retire to the Fort or Residency. Heroic sallies were occasionally made; and Agra was relieved early in October by the rapid and brilliant march of Colonel Greathed.—The 'district' of Agra is for the most part very level, and is deficient in water, though the soil is rich. The population in 1881 was 974,656, of whom about 100,000 were Mohammedans, Europeans, &c., the rest Hindus. —The 'division' of Agra embraces six districts, with an area of 10,151 sq. m., and pop. (1881) 4,834,064.

Agram (Croatian, *Zagreb*), capital of the Austrian province of Croatia and Slavonia, lies at the foot of a richly wooded range of mountains, about two miles from the Save, and 142 miles N.E. of Fiume by rail. It is divided into three parts: the upper town, built upon two eminences; the lower town; and the episcopal town. The cathedral, dating partly from the 11th century, is one of the finest Gothic buildings in Austria. Ninety per cent. of the inhabitants are Croats, who carry on a trade in wine, wood, and corn, and manufacture tobacco, leather, and linen. Repeated shocks of earthquake in November 1880 destroyed most of the public buildings, and overthrew 200 houses. Agram possesses a university founded in 1874, with 40 lecturers and 400 students, and a public library. Pop. (1880) 28,360.

Agrarian Laws, the land laws of the ancient Romans. With the name of agrarian laws used to be associated the idea of interference with private property in land, or of an equal division of it. This notion of the agrarian laws of the Romans was not only the popular one, but was received by most scholars. The French Convention, in 1793, passed a law punishing with death any one who should propose an agrarian law, understanding by the term an equal division of the soil among all citizens. Now, it would have been strange if the Romans, with whom private property was so sacred, could ever have been brought to sanction any measure of the kind. It was the German scholars, Heyne, Savigny, and especially Niebuhr, who first explained the true nature and character of the Roman agrarian laws. These laws had no reference to private lands held in absolute property, but to public or state lands.

Like other early communities, ancient Rome had a large *ager publicus* or public domain, which corresponded to the folkland of early English history. As the Roman dominion extended by the conquest of the surrounding peoples, the public domain increased by the appropriation to the state of considerable portions of their territory. The laws relating to the disposition of this public domain are a most important feature of Roman history, and are called agrarian laws. Instead of being an interference with the rights of private property in land, these laws were for the most part an assertion by the state of its right to dispose of the public lands for the public good.

The state was, however, often obliged to interfere with such occupiers of the public lands, and resume its rights. The very idea of a citizen, in ancient

times, involved that of a landholder, and when new citizens were to be admitted, they had each to receive their portion out of the unallotted public domain. But it was chiefly the powerful noble or patrician families who enjoyed the use of the state lands; and in spite of the destitution of the landless commons, these continued to assert their right of occupation, and even of permanent possession. Agrarian laws are associated with the earliest history of the city, but were the occasion of fierce conflict after the establishment of the republic, when the government of Rome passed into the hands of the leading nobles. In view of the distress of the commons, the consul, Spurius Cassius, proposed (486 B.C.) an agrarian law for a division of a certain proportion of the public land, and for enforcing the regular payment of the rent or tithe from the occupiers of the remainder. The aristocracy, however, defeated the proposal.

The most important agrarian law was that proposed by the tribune, Licinius Stolo, and carried, after a struggle of eleven years, in 367 B.C. Its provisions were as follows: 'Every Roman citizen shall be entitled to occupy any portion of the unallotted state land not exceeding 500 *jugera* (see ACRE), and to feed on the public pasture-land any number of cattle not exceeding 100 head of large, or 500 head of small, paying in both cases the usual rates to the public treasury. Whatever portions of the public land beyond 500 *jugera* are at present occupied by individuals, shall be taken from them, and distributed among the poorer citizens as absolute property, and at the rate of seven *jugera* apiece. Occupiers of public land shall also be bound to employ a certain number of freemen as labourers.'

This law produced for a time very salutary effects. But before the year 133 B.C., when Tiberius Gracchus was elected tribune, the Licinian law had been suffered to fall into abeyance. Numerous military colonies had been founded in the conquered districts; but there still remained large territories, the property of the state, which, instead of being divided among the poorer members of the state, were occupied by wealthy or powerful citizens, many of whom thus came to hold thousands of *jugera*. The accumulation of *latifundia* or large estates worked by slave labour, threatened altogether to destroy the free farmers, who had formed the backbone of the state. Under these circumstances, it was felt by many statesmen that reform was necessary in the public interest. Accordingly, Tiberius Gracchus had the boldness to propose an agrarian law to the effect that every father of a family might occupy 500 *jugera* of the state land for himself, and 250 *jugera* additional for each of his sons; but that, in every case where this amount was exceeded, the state should resume the surplus, paying the tenant a price for the buildings, &c., which he had been at the expense of erecting on the lands thus lost to him. The recovered lands were then to be distributed among the poor citizens; a clause being inserted in the bill to prevent these citizens from selling the lands thus allotted to them.

There was nothing essentially unreasonable in this proposal, which was, in private at least, approved of by some of the most distinguished men of the time. The energy of Gracchus carried the measure, in spite of the opposition of the aristocratic party, whose vengeance, however, could only be satisfied with the assassination of Gracchus and his brother (see GRACCHUS). The attempts to carry out the 'Sempronian law,' as it was called, were attended with great difficulties, and although not formally repealed, it continued to be evaded and rendered inoperative. Various agrarian laws

were subsequently passed, in a spirit directly opposed to the Licinian and Sempronian laws.

Besides the agrarian laws already mentioned, there were others of a more partial and local nature, for the establishment of colonies in particular conquered districts: these naturally met with less opposition. Totally different from the above were those violent appropriations of territory made by the victorious military leaders, in the later times of the republic, in order to reward their soldiers. In these the private rights of the previous occupants were often disregarded. The agrarian laws are only the Roman form of regulations and enactments regarding land, which are to be found in the history of every country. For modern land laws, see **LAND**.

Agricola, GNEUS JULIUS, a Roman of the imperial times, distinguished not less by his great abilities as a statesman and a soldier than by the beauty of his private character, was born at Forum Julii (now Frejus in Provence), 37 A.D. Having served with distinction in Britain, Asia, and Aquitania, and gone through the round of civil offices, he was in 77 A.D. elected consul, and in the following year proceeded as governor to Britain—the scene of his military and civil administration during the next seven years. He was the first Roman general who effectually subdued the island, and the only one who displayed as much genius and success in training the inhabitants to the amenities of civilisation as in breaking their rude force in war. In his last campaign (86 A.D.), his decisive victory over the Caledonians under Galgacus, in the battle of the Grampians (q.v.), established the Roman dominion in Britain to some distance north of the Forth. After this campaign, his fleet circumnavigated the coast, for the first time discovering Britain to be an island. Among the works executed by Agricola during his administration, was a chain of forts between the Clyde and Forth. The news of Agricola's successes inflamed the jealousy of Domitian, and in 87 A.D. he was recalled. Thenceforth he lived in retirement; and when the vacant proconsulships of Asia and Africa lay within his choice, he prudently declined promotion. The jealousy of the emperor, however, is supposed to have hastened his death (93 A.D.). His Life by his son-in-law Tacitus has always been regarded as one of the choicest specimens of biography in literature.

Agricola, JOHANN (originally Schnitter or Schneider, called also Magister Iselheim from his birthplace), born 1492, was one of the most zealous founders of Protestantism. Having studied at Wittenberg and Leipzig, he was sent in 1525 by Luther to Frankfurt, to institute the Protestant worship there. After his return, he preached in his native town of Eisleben until appointed to a chair at Wittenberg, which, however, he had to resign for his opposition to Luther and Melancthon in the great Antinomian controversy. He retired to Berlin, where he became court preacher to the elector, and here he died in 1566. He took an active part in the drawing up of the Augsburg *Interim* (q.v.). He wrote many theological books, but his collection of German proverbs with their explanations (first published in Low German in 1528, in High German in 1529) has assured him a permanent place in German literary history. See Kawerau, *Johann Agricola* (1881).

Agricola, RUDOLPHUS, the foremost scholar of the 'New Learning' in Germany, was born (1443) near Groningen, in Friesland. His real name, Roelof Huysmann ('husbandman'), he Latinised into Agricola; and from his native place he was also called Frisius, or Rudolf of Groningen. From Groningen he passed to Louvain, then to Paris,

and thence to Italy, where, during the years 1473–80, he attended the lectures of the most celebrated men of his age, and where he entered into a close friendship with Dalberg, afterwards Bishop of Worms. On his return home, he endeavoured, in connection with several of his former co-disciples and friends, to promote a taste for literature and eloquence. Several cities of Holland vainly strove with each other to obtain his presence; but not even the brilliant overtures made to him by the Emperor Maximilian, to whose court he had repaired in connection with affairs of the town of Groningen, could induce him to renounce his independence. At length yielding (1483) to the solicitations of Dalberg, he established himself in the Palatinate, where he sojourned alternately at Heidelberg and Worms, dividing his time between private studies and public lectures, and enjoying high popularity. He distinguished himself also as a musician and painter. With Dalberg he revisited Italy (1484), and shortly after his return died at Heidelberg, 28th October 1485. Most of his works were collected by Alard of Amsterdam (2 vols. Cologne, 1539). See Tresling's *Vita et Merita R. Agricola* (Gron. 1830).

Agricultural Holdings Act, 1883, gives the agricultural tenant in Scotland a right on quitting his holding to obtain pecuniary compensation from his landlord for the value to the incoming tenant of such unexhausted improvements, most generally made by tenants, as boning, manuring, &c. The compensation does not include what is due to the inherent capabilities of the soil. As regards such highly permanent improvements as buildings, roads, &c. no compensation is due unless the landlord's consent to their construction has been obtained; and in the case of drainage, the tenant must give notice to the landlord, so that the latter may have the opportunity of executing the drainage himself. The parties cannot contract themselves out of this act, but a specific agreement for what seems fair and reasonable compensation is accepted as fulfilling the tenant's right under the statute. From this compensation must be deducted sums due to the landlord for breach of the lease and for deterioration of the land, and account must also be taken of that portion of the crops sold off the farm during the last two years, which should properly have been consumed for manure. Notice of the intention to claim must be given four months before the end of the lease. The compensation is ascertained by statutory arbitration, which has proved an extremely costly business for both parties, subject to an appeal on certain general points to the sheriff. Although a tenant may be removed for failure to pay six months' arrears of rent, he does not lose his right to compensation. The act also provides that in agricultural leases of more than three years' duration, one or other party must give a notice of termination, not less than one year and not more than two years before the natural expiry; otherwise the lease goes on from year to year. The act also gives the tenant the important right of bequeathing his lease by will. The tenant is entitled to remove such fixtures as houses and engines, but he must give a month's notice to the landlord, who may then buy.

Agricultural Labourer. See **LABOURER**, **GANES**.

Agriculture, originally the tillage of the ground, is now applied in a wider sense to the practical-scientific business of the farm in all its details of tillage, crops, stock, labour, &c. The term 'practical-scientific' implies the application of the laws and principles of the exact sciences and

of scientific reasoning to the practice of the art of agriculture. Some such term is necessary to uproot the mistaken meanings associated with either of the words *practical* or *scientific* when used separately. Practical skill, to be really successful, must be guided by science, which is simply the experience of many, concisely arranged and systematised. The credit of science has suffered in the past by numerous and conspicuous failures of men possessed of a smattering of knowledge, but destitute of that necessary personal acquaintance with the actual details of work which is necessary to command success. The pleasures of a country life, and the handsome incomes that were gained by not a few successful farmers in times of agricultural prosperity, led many to agricultural pursuits who were, from want of sufficient training, quite unable to cope with the many and extremely intricate problems which arise naturally and inevitably, but which assume the form of insurmountable difficulties in the path of the uninitiated. True science was never at fault. It was the spurious and partial knowledge mistaken for it by the practical agricultural world. Had science been taken up by men reared in the business of farming, it would long ago have become the substantial and never-failing aid which it ought to be in Great Britain, and which it actually is in many foreign countries. British farmers are not, however, entirely without science, though it is usually on a much narrower basis than it ought to be. There is always in a farming family an amount of useful information handed down from father to son, which proves of much practical value, both in general respects and especially in the matter of local circumstances. The science which it would be well for the British farmer to possess is an aggregation of the more valuable of those family experiences, explained and amplified by the light shed on them by the study of the various allied sciences—sciences which have assumed more definite forms than we can yet claim for the science of agriculture.

Agriculture is one of the oldest of human arts, dating from long before the dawn of history. The savage who lives on the roots and fruits he finds ready to his hand stands lower in the scale than the huntsman living by the chase. The herdsman leading a nomadic life belongs to a higher stage of human culture; but civilisation in any full sense only begins amongst men with settled habitations, who till the soil for their sustenance. The inhabitants of the lake-dwellings of Switzerland are the oldest agriculturists and stock-keepers known to us. Amongst their relics we find the bones of cows, pigs, sheep, and goats, as well as of wild animals; corn-crushers were in use in every dwelling. Wheat, barley, millet, and flax seem to have been cultivated by these old-world folks, and apples and nuts were stored up by them (see CULTIVATED PLANTS). The Aryan (q.v.) peoples are believed to derive their name from a word akin to the Latin *arare*, 'to plough,' and to have thus been distinguished from the nomadic, non-agricultural races. But old as is the history of agriculture, its methods and implements, there are still plenty of tribes who neither plant nor sow. Land is still cleared and fertilised for a rude tillage by the ancient and destructive method of burning down all the herbage growing on it; and the most primitive digging-sticks and sharpened stakes are still used in some regions for turning over the soil, in the century that has perfected the steam-plough.

Egypt and Babylonia were amongst the great agricultural communities of the ancient world, and the leading principles of agriculture were zealously practised by the Romans. The Romans introduced

their methods into the countries conquered by them; and after the long decline caused by the barbarian irruptions, the Saracens in Spain gave a great impulse to systematic agriculture in Europe. The monastic communities scattered over Christian countries did not a little to foster agriculture on the broad lands that belonged to them. Every civilised country has, of course, developed its agricultural methods more or less directly in accordance with its climatic and other conditions. In this work the agriculture of the various countries of the world will be discussed in the several articles on those countries. The present article deals mainly with agriculture in the United Kingdom, past and present; illustrates the gradual development of British agriculture, and the remarkable recent decline in its prosperity; and gives information as to agricultural societies, agricultural education, and agricultural statistics. At the end are notes on the agriculture of the United States, Canada, and Australasia. The statistics show to what an enormous and exceptional extent Great Britain is dependent on other lands for her agricultural supplies—grain, dairy produce, meat—on the United States, Canada, Australasia, India, Russia, Hungary, and other countries. It may be premised that France, Germany, Denmark, Holland, and Belgium are well advanced in agriculture; Italy varies in various districts; Austria and Russia are backward, but productive; and India exports wheat to us. Chinese agriculture is remarkable for the care with which manure is preserved and economically applied to the best advantage.

Though Great Britain is the greatest manufacturing and mercantile nation in the world, agriculture is nevertheless her most important industry. Agriculture has profited greatly by the increasing wealth flowing in from other sources. Improvement in agriculture was considerable as far back as the 16th century; since then, vast strides of advancement have quite revolutionised ancient systems. Red clover and turnips were introduced as field-crops in the middle of the 17th century, and were extensively cultivated by the beginning of the 18th century. In Norfolk, the four-course shift (see ROTATION) was pretty widely adopted. The increased supply of winter food brought about a marked change in the treatment of farm stock; in consequence, the quality improved, early maturity became possible, and the numbers increased. A regular supply of beef and mutton could then be had all the year round. The heavy soils of the London clays, unsuitable for turnip growing, were mostly laid out in rich old pastures devoted to dairying. The high price of corn consequent on the increase of population, and the restrictions imposed on importation of food by duty charges, encouraged the breaking up of those pastures for the growth of wheat, barley, and clover. After thorough drainage, mangold was grown on these and other strong soils, situated in regions of moderate rainfall and plentiful sunlight. The area of bare fallow was thus much lessened, and a great increase of winter food for cattle procured. Much clay-land has during recent years of unremunerative grain-crop cultivation gone back to pasture, and this, as in older times, is now devoted to dairying, notably in the vicinity of London and other large cities, where the milk-trade has enormously increased, and continues to develop with the growing demand. Bakewell, in the latter half of the 18th century, improved many of the leading breeds of sheep and cattle, by selecting and breeding from the best specimens properly mated. His name is now specially associated with the Leicester breed of sheep. The brothers Colling followed him (one died in 1820, and the other in 1836), and carrying out his system, improved the shorthorn breed by

selecting the best strains of the old Durham cattle. Booth and Bates still further specialised the two great shorthorn families which now bear their names, and which retain certain well-marked characters of form and constitution contracted under their treatment. The side branches of the two parent stems are now too many to enumerate. The mingling of the two strains of blood has not always met with uniform success. The discovery of the value of concentrated or artificial manures (see MANURES), brought about marvellous alterations in agricultural practice. Bones, very roughly broken, were used with marked success in various districts in 1825. About 1840-1, Peruvian guano and dissolved bones came into use, particularly in the growth of turnips; and these manures were speedily followed by the introduction of dissolved coprolites and other mineral phosphates, and, within recent times, of nitrate of soda and sulphate of ammonia.

English agriculture has gone through very varied experiences of prosperity and depression. After the Repeal of the Corn Laws in 1846, its prospects were most gloomy, but it rose again with the revival and further development of trade, which was stimulated in an unprecedented manner by the vast increase in the application of steam in improving and hastening the means of transit by sea and land.

Another potent influence was the use of improved machinery, which facilitated farm-work and lessened the outlay for labour. Remarkable ingenuity and enterprise have been manifested by agricultural engineering firms during the past twenty years. Many machines and appliances altogether new have been placed in the farmer's hands, while those he formerly possessed have undergone great improvement all tending to increase their efficiency and lessen their cost. The application of steam power to farm-work has not quite realised the expected benefits. Deep ploughing has been to a large extent abandoned, but steam-power is still employed with advantage in digging, stirring, and harrowing the ground. With the increasing prosperity of the industrial classes, prices of farm-produce rose apace, and in the year 1870-73, British agriculture attained to an unprecedented point of prosperity. Unfortunately this flourishing state of matters was not long lived. Gradually the tide of prosperity receded, and the disastrously wet and sunless year of 1879 completed the wreck of many an industrious farmer. Since then the tendency has been continually downwards, and even yet there is but faint indication of improvement. A succession of bad years, with an excess of rain and a deficiency of sunshine, have curtailed the produce of crops, and lessened the store of fertility in the soil. Through increased foreign competition and diminished purchasing power amongst the industrial classes, the price of wheat fell between 1880 and 1886 from 50s. to 30s. per quarter, barley from 40s. to 25s., and oats and other products almost as much in proportion. For a time beef and mutton maintained their value wonderfully, but at last they also gave way. Between 1884 and 1887 beef has fallen from 80s. to 55s. per cwt., and the decrease in mutton has been almost as great. This enormous decline in prices - presenting from £3 to £5 per acre for wheat, and from £6 to £8 upon a two-year-old bullock - has dealt a terrible blow upon British farming. Thousands of farmers, formerly in comfortable circumstances, have been utterly ruined, and for the time being a large extent of poor, stiff, and stubborn land has been thrown out of cultivation; while a still larger area is being farmed at a loss to the occupiers, and little or no benefit to the owner. This, of course, cannot long continue, and as leases

fall out or tenants succumb, farms either revert to the proprietors' hands or are let at greatly reduced rents. The depression has fallen most heavily upon strong clay lands, and in some parts of England land of this kind brings in hardly enough to pay the tithe, not to speak of any rent to the proprietor; consequently it lies untenanted and unearned for. It is impossible to accurately foreshadow the immediate future of British agriculture, but it seems more than probable that, at any rate for a considerable time to come, farming will be conducted with less capital than formerly, and altogether at an easier pace, with a lower level of prices.

Scottish agriculture was far behind in the 17th century, but acquired a marvellous impetus through the Union in 1707. The opening up of a market for her surplus sheep and cattle gave encouragement to their increase and improvement. The development of railroads has since placed Scotland within reach of the populous consuming centres, and encouraged the growth of agriculture in all branches. Smith of Deanston, about 1835, advocated deep ploughing and the revival and wide extension of thorough Drainage (q.v.). Drainage, when carried out on a proper system, has been universally advantageous to both England and Scotland; but deep ploughing up of the subsoil has had to give way to stirring without bringing it to the surface.

The greater portion of Scotland is in pasture, owing to its elevated position and to the climate in these parts being unsuitable to crop cultivation. The mountain tracts are improved by surface-drainage, and are mostly devoted to the rearing of black-faced (Scotch) and Cheviot sheep. These, the Border Leicesters, and crosses of this and other varieties of Leicester with the mountain sheep, compose the bulk of the Scotch flocks.

The system prevailing in Scotland, of letting land on lease for nineteen or twenty-one years, by giving security and independence to occupiers, was a fruitful means of raising the standard of Scottish agriculture to the high state of perfection which it attained. Leases were all very well when, in spite of temporary depressions sometimes extending over a number of years, the tendency of the times was steadily inclining to a higher level of prices. The system has entirely broken down with the continued fall of prices, the result of a combination of altered circumstances which seem to have too wide a basis to admit of speedy improvement. Prominent amongst these are the depreciation in the value of gold, competition in our markets of foreign agricultural produce, the small profits to employers resulting from our national trades and manufactures, associated with a series of bad seasons. The advent of unprosperous times was followed by agitation among farmers for alterations in the laws affecting land; and hypothec in Scotland, and distress in England, were rightly abolished in a manner calculated not to suddenly affect existing interests. A royal commission on agriculture was appointed in 1879, and after careful inquiry and deliberation, reported on the agricultural position, and the best means of improving it. In 1880, the Ground Game Act was passed, and tenants acquired an inalienable and joint right with proprietors to destroy hares and rabbits under certain restrictions, with the result that hares are now almost extinct in many districts, though rabbits continue, especially in dry seasons and on light soils, to do appreciable damage.

The Agricultural Holdings Acts (q.v.) sought to give compensation to farmers for improvements carried out at their own expense. They have not proved at all satisfactory, through the great practical difficulties of applying the conditions laid down

—more especially as to the compensation for unexhausted manures. Many farmers' clubs have fixed scales of values, but conditions differ so enormously that even the best practical referees vary widely in their decisions. No legislation can ever equitably settle the relations between owners and occupiers. Its true function is to place both classes on an equal footing with regard to freedom of action, and allow the common economic laws to mould their agreements. The efforts on behalf of farmers have not preserved very many from bankruptcy, and much of the land of the country is falling back upon the owners' hands. This is more especially the case with the larger farms where more or less of the working capital was borrowed. The class of arable farms which has suffered least is that of moderate-sized holdings of from 80 to 250 acres, where a system of mixed husbandry is the general practice. Grain-growers were the first to suffer, as beef and mutton long remained at a high rate, though they have at last come down quite below remunerative prices.

In *Ireland* the want of mining and manufactures has driven too large a share of the population to agriculture. The excess in the numbers of the smaller farming class has also fostered the difficulty and encouraged the multiplication of small holdings. Since the failure of the potato crop in 1845, the population has gone down from seven to five millions. It is still too numerous for the country, considering the impoverished condition of the soil of the smaller holdings. Ireland is a rich grazing country; but much of the land is in urgent need of drainage. If drained, it would, with the congenial climate, yield a good return. The agriculture of the north of Ireland is, as a rule, superior to the midland and southern districts. Flax has long been widely cultivated in the north, and of late years much ryegrass seed has been grown. The common cattle of Ireland

have improved in quality within recent times through the introduction of good shorthorn bulls. Ireland is now the breeding-ground of many of the grazing cattle of England and Scotland. The great sale-product of the Irish tenant is butter, which is often of a very inferior quality, owing to the want of skill in keeping and handling the milk and cream. Rapid improvement is being made through the recent efforts to teach a scientific system.

The state department 'for consideration of the matters relating to agriculture' is a committee of the Privy Council, and it administers the acts for preserving English cattle from contagion. The United States Department is presided over by a commissioner. France, Prussia, and other European countries have special ministers for agriculture.

AGRICULTURAL STATISTICS.—At the present juncture, in the heart of a crisis in agriculture, peculiar interest attaches to the tolerably ample, yet not quite complete, statistics which are collected by government from the owners and occupiers of land in the United Kingdom. The total area of land and water in the United Kingdom is 77,799,793 acres. Of this, 47,895,770 acres were in 1885 under crops, bare fallow, and grass, as compared with a yearly average in 1867-70 of 45,829,283 acres. The extent of permanent pasture or grass, not broken up in rotation (exclusive of heath and mountain land), in 1885 was 25,616,071 acres, showing that in that year the extent of arable land was 22,279,699 acres, or 1,468,218 acres less than the average of the years 1871-75—the highest point reached in the extent of land cultivated.

The following table shows the mean areas of the various crops in Great Britain, and in the case of the cereals, the estimated average annual value of the grain, during three periods, the first two of ten years each—1866-75, and 1876-85; and the third, 1885:

AVERAGE AREAS AND VALUE OF PRINCIPAL CROPS IN GREAT BRITAIN.

	NUMBER OF ACRES			VALUE		
	1866-75	1876-85	1885	1866-75	1876-85	1885
Wheat	3,500,000	2,800,000	2,400,000	£31,500,000	£21,900,000	£15,000,000
Barley	2,500,000	2,300,000	2,200,000	£18,900,000	£16,900,000	£14,000,000
Oats	2,700,000	2,800,000	2,900,000	£16,900,000	£15,400,000	£13,600,000
All Corn Crop	9,400,000	8,800,000	8,300,000			
All Green C.	3,500,000	3,500,000	3,500,000			
Clover and other Forage Crops	4,100,000	4,400,000	4,600,000			
Arable Land	18,000,000	17,000,000	17,200,000			
Permanent Past.	12,400,000	11,400,000	10,300,000			
Cultivated Area	30,400,000	28,400,000	27,500,000			

The area under wheat has decreased nearly *one-third* in twenty years, and the total value more than *one-half*. Barley shows practically no decrease in area, but a drop of over twenty per cent. in price. Oats cover a slightly increased area, but have fallen nearly eighteen per cent. in price. The green-crop area is nearly uniform throughout;

while that of forage crops has increased twelve per cent. and permanent pasture twenty-three per cent.

The next table shows the average numbers of British sheep and cattle; also the averages of beef, mutton, and wool, for the three periods 1866-75, 1876-85, 1885:

AVERAGE NUMBER AND VALUE OF CATTLE, SHEEP, ETC.

	AVERAGE NUMBER.				VALUE.		
	1860-75	1876-85	1885		1866-75	1876-85	1885
Cattle	5,500,000	5,000,000	4,900,000	Beef	£368,000	£399,000	£442,000
Sheep	28,300,000	26,600,000	26,500,000	Mutton	£354,000	£333,000	£332,000
				Wool	£61,000	£60,000	£44,000
					£21,500,000	£22,500,000	£22,000,000
					£22,100,000	£21,500,000	£18,200,000
					£11,800,000	£8,800,000	£4,900,000

The following table shows the extent under the various crops, and the estimated average produce of each crop per acre in Ireland for the years 1874-83 and 1884:

The following table gives in a concise form a comparison of the agricultural products of England and the Continent of Europe :

Popul.	Tons of produce per sq. mile.			sheep per sq. i.	Yield per Acre		
	No.	Cows per sq. mile.	Other Cattle per sq. mile.		of Wheat.	of Barley.	of Potatoes.
England.	483	36	57	322	28.9	34.4	252
Austria..	192	36	38	33	15.7	13.5	109
Hungary	16	126	15	24	85	11.5	13.6
France..	38	184	31	32	110	15.3	18.7
Germany	45	217	43	32	92	18.9	11.1
Holland.	4	315	77	37	66	21.4	41.9
Belgium.	87	70	51	32	25.9	34.9	173
Sweden..	27	8	4	8	..	..	124
Italy ..	28	257	16	21	11.9	..	..

DIVISION OF LAND.—The division of land is an interesting question relating to British agriculture. It is interesting as to both ownership and occupation. In the so-called Domesday Book for the United Kingdom (1873), the landowners are divided into two classes—those who own less, and those who own more, than an acre of land. The former, who comprise 70 per cent. of the whole, cannot be regarded as agricultural landowners; and exclusive of these it is found that one-fourth of the remaining territory is held by 1200 persons, with an average of 16,200 acres for each; another fourth by 6200 persons, with an average of 3150 acres each; another fourth by 50,770 persons, with an average of 380 acres each; and the remaining fourth by 261,831 persons, with an average of 70 acres each. The perage of the United Kingdom, numbering about 600 persons, possess among them rather more than a fifth of all the land, and between a tenth and an eleventh of its annual income. It has been roughly calculated from these figures that one person in about every hundred of the population is a landowner, and that every twentieth head of a family is an owner of more than an acre of land. Altogether, there are 1,481,000 landowners and farmers in the United Kingdom; and, reckoning these as heads of families, they comprise more than one-fifth of the total male population. In addition to these, upwards of 1,500,000 are employed as farm labourers.

The tenant farmers of the United Kingdom number about 1,161,000—561,000 in Great Britain, with an average of about 56 acres of cultivated land; and 600,000 in Ireland, with an average of 26 acres of cultivated land. In Ireland there is a much greater proportion of small holdings than in Great Britain. Nearly half the land of Ireland is held in farms under 15 acres in extent, less than one-fifth of Great Britain being so occupied. The following table, prepared in 1886 by Major Craigie, shows at a glance how the land of England is now divided in occupation :

HOLDINGS.	Acres.	Percentage of Area.
$\frac{1}{2}$ of an acre and under 1 acre.....	9,988	0.04
1 acre to	286,526	1.15
5 acres to 20 acres	1,219,667	4.89
20 acres to 50 acres	2,042,373	8.09
50 acres to 100 acres	3,285,350	13.19
100 acres to 500 acres	10,785,988	41.32
500 acres to 500 acres	1,328,722	5.19
500 acres to 1000 acres	2,697,794	10.83
Above 1000 acres.....	730,128	2.84
	24,891,591	
294,729 holdings under 50 acres ..	10,158,000	40.80
115,525 holdings between 50 and 500 acres ..	7,899,000	31.72
4,696 holdings over 500 acres ..	1,034,000	4.15

CAPITAL EMPLOYED IN AGRICULTURE. As to the amount of capital employed in agriculture is not easy to arrive at precise and trustworthy figures. By statisticians of note widely divergent

estimates have been formed. The past thirty years have witnessed enormous expansion and contraction in the capital of both the owners and occupiers of land. The gross annual value of 'land' in the United Kingdom assessed for income-tax in 1857 was £55,856,000—England, £41,177,000; Scotland, £5,932,000; and Ireland (1862), £8,747,000—which, at twenty-five years' purchase, represented a capitalised sum of £1,396,400,000. By 1875 the total in the same return had risen to £66,911,000—England, £50,125,000; Scotland, £7,493,000; and Ireland, £9,293,000—showing a gross increase of £11,055,000 in twenty years. Thus, according to this return, the landowners' capital in 1875 amounted to no less than £1,672,775,000—an increase of £276,375,000 in twenty years. Since then the value of landed property has tumbled down headlong; and it is probably within the mark to say that to-day the capital of the landowners of the kingdom is less than it was in 1875 by 30 per cent.—or say by £500,000,000. In an official return made to the House of Commons for the years 1883-84, the gross annual value of 'land,' as assessed for income-tax in the United Kingdom, is stated at £65,442,000. This, at twenty-five years' purchase, would amount to £1,636,050,000; but there is no doubt that the value of the landowners' property is now very far short of that formidable sum. It should be explained that 'land' in this return does not include gardens and plots less than one acre, but embraces buildings and all the landowners' property upon the land.

The capital employed by the tenant-farmers of the United Kingdom has been variously estimated at from one-fifth to one-third of that credited to the landowners. In 1878 Sir James Caird estimated the tenant farmers' capital at upwards of four hundred millions sterling. Major Craigie, at the same time, assumed £8 per acre of cultivated land as the average; and this brought out a total of £376,000,000. Mr R. Giffen, of the Board of Trade, in his famous paper upon 'Recent Accumulations of Capital,' also prepared in 1878, estimated the capital of the tenant farmers at no less than £668,000,000, or an average of £14 per acre. Assuredly Mr Giffen's estimate was too high; and this has now been recognised in government quarters, for in the Parliamentary Return just referred to for 1883-84, the tenant-farmers' capital is given at £300,000,000. This is probably above rather than below the mark. The loss in farmers' capital since 1875 can hardly be under £100,000,000; and, reckoning the landowners' loss at five times as much, there has been a loss through the agricultural depression of no less than £600,000,000—a vast sinking of property in the short space of twelve years, far exceeding the increase of the preceding thirty years.

AGRICULTURAL SOCIETIES, associations, and clubs have been formed for the purpose of educating all classes connected with land by means of shows, meetings for discussion, the publication of journals or transactions, the employment of scientific advisers as chemists, botanists, and entomologists; the carrying out of experiments on the growth of crops and the feeding of animals; the teaching of scientific classes, and offering bursaries, diplomas, certificates, and prizes for proficiency in the study of scientific agriculture; and for influencing the legislature in matters affecting the agricultural interests. The three great national societies follow out more or less perfectly the whole programme. Agricultural societies have, as a rule, devoted too much attention to shows, and neglected other equally important branches.

The Royal Agricultural Society of England was formed in 1838. It has over 9000 members, holds

annual shows, and publishes a half-yearly journal. The income of the society for 1885 amounted to £34,800. The Highland and Agricultural Society of Scotland dates from 1784, but was incorporated by royal charter in 1834. The capital of the society amounts to over £70,000. The expenditure for 1884-5 was £6500; this in recent years has rather exceeded the income. The Royal Agricultural Society of Ireland was founded in 1841, and has an annual income of about £2800. In 1887 it was about to be amalgamated with the Royal Dublin Society, which was established by royal charter in 1749, and has an income of over £7400.

The Bath and West of England Society and Southern Counties Association, originated in 1777, is the largest local society in England. And there are numerous other local societies scattered over the country.

Herd and Stud Book Societies are numerous throughout the country. They publish accurate records of the pedigrees of our best stock, and thereby preserve the purity of the various breeds.

AGRICULTURAL EDUCATION. In addition to the study of the theory and practice of scientific agriculture, the more prominent subjects under this head are chemistry, geology, biology, elementary natural philosophy, meteorology, and agricultural economics. *The theory and practice of agriculture* should embrace field demonstrations by qualified instructors, besides lectures on the following subjects: (1) Definition of agriculture; its relations to allied sciences. (2) Surface geology; soils - their properties; nitrogen in soils; the effect on soils of cultivation and the growth of plants. (3) Drainage; irrigation; wet-warping; top-dressing; liming, &c.; paring and burning. (4) Implements and machines - construction and careful management. (5) Steam cultivation. (6) The motive powers - 1st, man; 2d, horse; 3d, the mechanical powers. (7) Farm servants - labour and wages; details of horse and hand labour. (8) Rotations - reasons for their adoption; systems of farming. (9) Our farm crops - selection and cultivation; insect injuries and diseases, and their prevention. (10) Grasses and other pasture plants - adulterations of - &c. (11) Management of permanent pastures - methods of making new pasture. (12) Weeds, and means of destroying them. (13) Silage, and the system or ensilage. (14) Manures - farm-yard manure; special manures and 'artificial' - their uses and adulteration; liquid manure and town sewage. (15) Farm buildings and fences, &c. - covered yards. (16) Live-stock - embracing cattle, pigs, horses, sheep, and poultry; the principles of breeding; feeding and management; cost of producing meat. (17) Dairying in all its branches. (18) Feeding stuffs - qualities and manure-values.

It is the function of agricultural chemistry, the most important of the allied sciences, to discover of what elements cultivated plants are composed, and how plants may most effectively be supplied with the materials necessary for promoting their growth without permanently exhausting the soil. This subject will, in its various aspects, be discussed at **VEGETABLE CHEMISTRY, MANURE, SOILS, ROTATION OF CROPS, &c.** The farmer should also know the elements of Veterinary Medicine (q.v.).

In Britain, government has never supported agricultural education as the importance and necessities of the case demand. The only material support given is to a chair of agriculture (four lectures) at the Normal School of Science, South Kensington, a grant to the chair of agriculture in Edinburgh, and the payment of small grants to teachers in school and science classes, who include agriculture in their instruction. Abroad it is very

different. America has many well-appointed agricultural colleges receiving state aid, and most continental nations support well-regulated institutions for the teaching of agriculture. France contributes largely from the public purse in support of higher, intermediate, and lower agricultural education; and Denmark spends £11,000 annually.

There are only three main centres in Britain where a full course of agricultural education, associated with a suitably arranged curriculum of study in the allied sciences, can be obtained—(1) the University of Edinburgh; (2) the Royal Agricultural College, Cirencester; and (3) the College of Agriculture, Downton, near Salisbury. There is only one degree associated with agriculture—viz. Bachelor of Science (B.Sc.), in the department of agriculture (instituted 1886), granted by the Edinburgh University. The two colleges named are in a manner affiliated with the university, as their teaching is held as so far qualifying for the degree. The chair in Edinburgh was founded and endowed in 1790. Since 1868, government has given a yearly grant of £150. The lectures (about one hundred) are delivered during the winter session of five months to about fifty students. Practical agriculture is acquired by residence on a farm near Edinburgh, and by Saturday excursions to selected farms conveniently situated.

The Royal Agricultural College at Cirencester was founded in 1845. The fees were gradually raised from £70 to £90 in 1850, to the present figures; in-students, £135 per annum, or £45 per term of between ten and eleven weeks. Out-students pay £25 per term. The staff consists of six resident professors, besides lecturers.

The Downton College is a successful private venture, established in 1880. It is in many respects like its prototype the Royal Agricultural College. The students, numbering about fifty, pursue a similar course of study under a regular teaching staff of six professors and others. A good sound ground-work of scientific and, so far, practical education can be got at either institution by proprietors, farmers, land-agents, or colonists. The great mistake which many make is to imagine that two years is sufficient length of time to learn the intricate business of farming or estate management. However well directed the work may be during the full course, some years ought afterwards to be spent by every one in further pursuance of study and application to business, under a well-qualified instructor in actual business either as a land-agent or farmer.

In Aberdeen University a free annual course of twelve lectures is given on agricultural subjects. In the university of Oxford a professorship of Rural Economy was established in 1796. There are agricultural schools at Aspatiria, near Carlisle, and at Alvercot Priory; and in some public schools agriculture is taught. The Albert Institution at Glasnevin, near Dublin, which has existed since 1838, is a great Irish agricultural college.

AGRICULTURAL EXPERIMENTS.—Rothamsted, the private experimental station of Sir J. B. Lawes, Bart. has been by far the most important. It has been justly asserted that the work done there has eclipsed that of all other stations put together. It was founded in 1843, when Dr J. H. Gilbert joined Sir John (then Mr Lawes) as chemist and colleague. Several thousands of pounds are now spent annually, and Sir John set apart £100,000 to provide the means for continuing the work after his death. The experiments are most carefully carried out by a highly scientific and practical staff, and the results regularly published may be thus classified: (1) Field experiments on manures and vegetation, as the growth of grass plants and of the leading crops, in rotation, or year after year

on the same land, without manure, and with every variety of manure. (2) Soil investigation at various depths. (3) Rainfall and drainage, particularly as to the matter of the supply and loss of combined nitrogen. (4) Transpiration of water by plants of different orders. (5) Botanical characters of plants, showing the variation in constitutional requirements, and the different powers of plants in assimilating food. (6) Sources of useful nitrogen. (7) Animals' nutrition.

Woburn experimental station is next in importance. It was started in 1876 by the Royal Agricultural Society of England, on a farm set apart by the Duke of Bedford. Excellent work, mainly confirmatory of the Rothamsted experiments, has been carried out, first under the late Dr Augustus Voelcker, and recently under his son, Dr John Voelcker.

The Bath and West of England Society also conducts similar experiments of value. The Highland and Agricultural Society commenced a series of field experiments in 1876, but the results have not been considered equivalent to the money expended, and the work is to be discontinued. In 1876, too, experiments were begun in Aberdeen; but the findings of these and of the Sussex experiments under the same management vary materially from those of Rothamsted and Woburn. Experiments on a smaller scale are carried on at the agricultural colleges and by some of the more enterprising farmers' associations—as, for example, in Easter Ross.

UNITED STATES AND CANADA.—In North America, much the same crops are raised as in corresponding latitudes in Europe, except to northward, where there are vast areas of inarable ground. The winters in Canada and the United States are much more severe than those of Western Europe, while the summers are quite as hot and moist, and hence arise considerable variations in the practice of agriculture. In Canada and the northern states, wheat is a staple article of export. In some exporting districts, wheat and red clover are grown as alternate crops. In Canada and the adjacent states and territories, spring wheat is more profitable than the ordinary winter wheat. South of 42°, winter wheat is more commonly the standard crop. Wheat is the great staple in the northern half of the Mississippi Valley and on the Pacific slope. Enormous quantities of wheat are exported from the United States and Canada to Britain (see **WHEAT**). Between latitudes 42° and 39°, wheat is often grown alternately with maize, after the land has been under pasture for some years. Again, between latitudes 39° and 35°, the climate is better suited for maize than wheat, which becomes less productive. Below latitude 35°, maize is much less productive, and the climate becomes suitable for cotton. This plant furnishes the staple article of production from latitude 35° to the shores of the Gulf of Mexico. Rice is a very profitable crop in some of the southern states; but its culture is chiefly confined to swamps which can be flooded by fresh water. The sugar-cane is chiefly limited to the rich alluvial lands near the Mississippi as far north as latitude 31°. Tobacco is a principal crop in several states. On the Pacific coast, the climate is characterised by mild winters and dry summers, so that the methods of agriculture must conform to those of the countries bordering on the Mediterranean. On the great plains of the western half of the continent, and also in the Rocky Mountain region and in Texas, there are many extensive 'ranches' for the pasturage of cattle and sheep. In the northern states and Canada, dairy products form leading articles of export. The American agriculturist has come to be a very formidable competitor

with the British farmer in the markets of the old country.

In the United States, associations for the promotion of the science of agriculture are very numerous, embracing in their scope the interests of agriculture proper, horticulture, stock-raising, dairying, bee-keeping, fish-culture, and kindred industries, and ranging in importance from the Government Department of Agriculture at Washington (established in 1862) to the ordinary country fair for the exhibition of domestic products. Almost every state and territory has its general agricultural society, while numerous inter-state, sectional, and county associations abound, having for their object the promotion of agricultural interests.

The cause of agricultural education and instruction in the mechanic arts in the United States has received liberal encouragement by grants of public lands by congress. In 1862 an act was passed presenting to each state which may provide colleges for these purposes, 30,000 acres of the public domain for each senator and representative in congress, to be applied exclusively to education. The states availed themselves of the offer, and about fifty colleges of industrial education (generally embracing a course in agriculture) have been established, either as distinct institutions or departments of institutions previously in existence. The systems of instruction in these institutions vary, but in general embrace—in addition to the studies usually pursued in schools of this grade agricultural chemistry, with qualitative and quantitative analysis of soils and fertilisers; practical agriculture, including the subjects of soils, drainage, irrigation, and fertilisation; experimental farming, fruit-culture, floriculture, market-gardening, landscape-gardening, farm crops, farm implements, farm animals, veterinary science, vegetable physiology, zoology, entomology, &c.

AUSTRALASIA exports large quantities of wool, mostly to London, where it is sold at the great periodical colonial wool-sales to buyers from all quarters. The growth of the trade in sheep-carcases has encouraged colonial breeders to cross the original merino wool-producing flocks with long-wool sheep to give increase of flesh. Many districts are liable to droughts which cause the death of millions of sheep, unless much capital is expended in building dams to hold water. These losses, and the low price of mutton in this country, have recently checked the dead-meat trade; and English farmers may have really more to fear from an increase of sheep on the vast tract of fine land on the River Plate, not subject to loss from drought, than from our Australasian colonies. Wheat and permanent pasture grass-seeds are now largely imported from Australia and New Zealand.

The following are among the numerous subjects connected with agriculture which receive separate treatment in this work, each under its own head:

Antony.	Dairy.	Land Laws.	Plough.
Anthrax.	Drainage.	Landlord & Tenant.	Potato.
Barley.	Emigration.	Lease.	Reaping.
Beau.	Farm.	Maize.	Rent.
Beet.	Fodder.	Mangold-wurzel.	Rotation.
Beet-tust.	Fool-A-Mouth.	Manure.	Sheep.
Bird.	Disease.	Oats.	Tenant-right.
Bitter.	Grasses.	Parasites.	Thrashing.
Cattle.	Guano.	Pasture.	Turnip.
Corn.	Hay.	Pea.	Veterinary
Corn.	House.	Pleuro-	Medicine.
Corn.	Infection.	Pneumonia.	Wheat.

See the standard work on practical agriculture, *Stephen's Book of the Farm* (1842; new ed. by James Macdonald, 1887); *Morton's Encyclopedia of Agriculture* (1855; rather out of date); *Morton's Farm Series*; *Wilson's Our Farm Crops*; *Pringle's Live-stock Farm* (2d ed. by Macdonald); *The American Cyclopaedia of Agriculture*, (1882); and Thorold Rogers's *History of Agriculture and Prices in England* (6 vols. 1865-88).

Agrirentum (Gr. *Akragas*), the modern Girgenti, a town on the south coast of Sicily, founded by a colony from Gela (582 B.C.), and in the earlier ages one of the most important places in the island. In its palmy days, about the end of the 5th century B.C., it is said to have contained 200,000 inhabitants; and its territory extended right across Sicily. After being at first free, and then subject to tyrants—one of whom was Phalaris—it was utterly demolished by the Carthaginians (405 B.C.), and never quite recovered its importance. In the course of the Punic wars, it was compelled to submit to the Romans. From 827 to 1086 A.D. it was in the possession of the Saracens, from whom it was conquered by Count Roger Guiscard. The modern Girgenti (q.v.) still shows numerous and splendid ruins, of which the best preserved is the Temple of Concord. The largest temple was that of Jupiter, 340 feet long, which was never finished, and of which only some fragments remain. Other ruins are the temples of Juno, of Heracles, and Esculapius. Empedocles was born here.

Agrimony (*Agrimonia*), a genus of Rosaceæ (q.v.), sub-order Potentillæ. The Common Agrimony (*Agrimonia eupatoria*) is a native of Britain



Common Agrimony (*Agrimonia eupatoria*).

and other parts of Europe, growing in borders of fields, on waysides, &c. It has an upright habit, attains a height of 2 feet or more, and has interruptedly pinnate leaves, with the leaflets serrate and downy beneath. The flowers are small and yellow, in close racemes. The whole plant has a pleasant, slightly aromatic smell, and is bitter and styptic, and was much valued in domestic medicine; a decoction of it being used as a gargle, the dried leaves as a kind of herb tea, and the root as a vermifuge.—Very similar to this is *A. parviflora*, a native of the United States. It has a very agreeable fragrance. *A. incisæ* is common in the Southern Atlantic States.

Agrippa, CORNELIUS, a cabalistic philosopher, born at Cologne of the noble family of Nettesheim (1486), was educated at the university there, and early entered the service of the Emperor Maximilian. By him he was sent on a secret mission to Paris (1506), where he joined a theosophic society, and whence he engaged in a madcap expedition to Catalonia. In 1509 he was invited to teach theology at Dôle, in Burgundy. His lectures on Reuchlin's *De Verbo Mirifico* attracted great attention, but drew on him the bitter hatred of the monks, and he was obliged to resume a diabolical career. He was sent, in 1510, by Maximilian to London, where he was Colet's guest. In 1511 he was summoned to join the imperial army in Italy, and for three years followed the camp;

in 1515 he lectured at Pavia, and was made doctor both of law and medicine. In 1518 he became town-ordinator at Metz; but in 1520 he was back in Cologne, having roused the hostility of the Inquisition by his defence of a witch. His old enemies, the monks, persecuted him still in Cologne, so that he went to Fribourg in Switzerland, where he started a medical practice. In 1524 he removed to Lyons, as physician to the queen-mother of France; but here his character of occult philosopher, of semi-Lutheran even, soon furnished pretexts for neglect. He could get no salary; and at last, in 1528, he departed to Antwerp, where he was appointed historiographer to Charles V. He now began to publish his works, *De Incertitudine et Vanitate Scientiarum* (1530), *De Occulta Philosophia* (1531-33), and *De Nobilitate Feminei Sexus* (1532), the last two written more than twenty years earlier. The first displeased both emperor and monks; the second procured him the title of magician. Once more he could get no salary, and was thrown into gaol for debt. Then he retired to Mechlin, and married a third wife, who proved unfaithful; and then, again forced to flee, he set out on the way to Lyons. He had hardly crossed the French border when he was cast into prison for slandering the queen-mother; and though he was soon released, he reached Grenoble only to die (1535). The monkish fables—of Agrippa's black poodle, of his magic mirror, and of his overcurious pupil, who was rent in pieces by demons—have given place to a just estimate of his character as an earnest searcher after truth, who vainly would have unlocked Nature's mysteries had he only held the right key. His complete works appeared at Lyons (*circa* 1550). See his Life, by H. Morley (2 vols. 1856).

Agrippa, M. VIPSANIUS (63-12 B.C.), a Roman who, though not of high birth, rose to an exalted position through his own talents. He was a fellow-student of Octavian at Apollonia in Illyria, and was one of his closest friends and most trusted counsellors throughout his life. As a general, he laid the foundation for the sole dominion of Octavian, commanded his fleet in the battle of Actium (31 B.C.), and did good service in Gaul, Spain, Syria, and Pannonia. He was generous, upright, and a friend to the arts; Rome owed to him the restoration and construction of several aqueducts, and the Pantheon, besides other public works of ornament and utility. He was married three—to a daughter of T. Pomponius Atticus, to Marcella, niece of Augustus, and lastly to Julia, daughter of Augustus. A daughter of his first wife married Tiberius, the successor of Augustus; while the noble Agrippina, wife of Germanicus, was his daughter by Julia.

Agrippina. (1) The daughter of M. Vipsanius Agrippa and Julia, daughter of Augustus. She married Germanicus, and accompanied him in his campaigns, and on his sudden and suspicious death in Asia, carried his ashes with dutiful affection to Rome. The esteem in which she was held by the people made her hateful to Tiberius, and in 30 A.D. he banished her to the island of Pandataria, where she died by voluntary starvation three years later. There are four fine portrait-busts of her at Dresden, and that in the museum of the Capitol at Rome is one of the masterpieces of Roman sculpture.—(2) Her daughter, AGRIPPINA, was one of the most detestable women that have lived. She was born at Cologne, hence called *Colonia Agrippina*. She first married Cn. Domitius Ahenobarbus, by whom she had a son, afterwards the Emperor Nero. Her third husband was the Emperor Claudius, though her own uncle. She soon persuaded him to adopt as his successor her son Nero, to the exclusion of Britannicus, his own son by his former

wife, Messalina. She then proceeded to remove by poison all his rivals and enemies, and finally the emperor himself. Her ascendancy proving intolerable, Nero caused her to be put to death in 59 A.D.

Agtelek, a Hungarian village to the N.E. of Pesth, near one of the largest and most remarkable stalactitic caverns of Europe. The cavity opens at the foot of a limestone mountain with an entrance scarcely $3\frac{1}{2}$ feet high by 5 feet wide. It consists of a labyrinth of caverns communicating with one another, many of which it is difficult, and even dangerous, to explore when the subterranean streams that flow through them are high. Numerous stalactitic structures occur in all the caverns, which, from their singular shapes, have given rise to the various names of the Cathedral, Paradise, the Bat's Cave, the Flower-garden, the Ruins of Palmyra, &c. The new cavern was first thoroughly explored in 1856. Some of the caverns are nearly 100 feet in height. Remains of the cave bear are found in them.

Agnado, ALEXANDER MARIA, one of the wealthiest bankers of modern times, was born at Seville in 1784, of Jewish family. During the Spanish war of independence, he fought with distinction on the French side, rose to the rank of colonel, and acted as aide-de-camp to Marshal Soult, but retired in 1815, and began a commission business at Paris. Founding a bank, he soon became one of the first bankers in Paris. He negotiated several Spanish loans, and Ferdinand VII. made him a marquis. He was naturalised in France in 1828, and at his death, 14th April 1842, left a fortune of above 60 million francs.

Agua Calientes, a town of Mexico, capital of a central state named after it, with an area of 2900 sq. m., stands on a plain 6000 feet above the sea-level, 270 miles N.W. of the city of Mexico. The town is favorably situated for trade, and is on the Mexican Central Railway. It is surrounded by fine gardens, and contains some handsome public buildings. The environs abound in hot springs, from which the town takes its name. Pop. (1882) 22,000.

Ague (*Febris intermittens*) is the common name for an intermittent fever accompanied by paroxysms or fits. Each fit is composed of three stages: the cold, the hot, and the sweating stage. Before a fit, the patient has a sensation of debility and distress about the epigastrium; feels weak and disinclined for exertion; the surface of his body becomes cold, and the bloodless skin shrivels up into the condition termed goose skin (*cutis asserina*). A cold sensation creeps up the back, and spreads over the body; the patient shivers, his teeth chatter, his knees knock together; his face, lips, ears, and nails turn blue; he has pains in his head, back, and loins. This condition is succeeded by flushes of heat, the coldness gives place to warmth, and the surface regains its natural appearance. The warmth continues to increase, the face becomes red and turgid, the head aches, the breathing is deep and oppressed, the pulse full and strong. The third stage now comes on; the skin becomes soft and moist, the pulse resumes its natural force and frequency, and a copious sweat breaks from the whole body.

These paroxysms recur at regular intervals. The interval between them is called 'an intermission.' When they occur every day, the patient has *quotidian* ague; every second day, *tertian*; and when they are absent for two days, *quartan*. There is a *double quotidian* in which two paroxysms occur daily; in the *double tertian* there is a daily attack, but the paroxysms of successive days differ in some respects, while those of alternate days agree in character. *Quintan*, *sixtan*, *heptan*, and *octan* cases

are extremely rare. All ages are liable to this disease.

The exciting causes of this disease are unknown, but are thought by some to be effluvia from the surface of the earth (marsh miasmata). Others, again, such as Klebs, Tommasi-Crudelli, Cecchi, Laveran, and Osler, believe that a bacillus of some kind causes the disorder. Their researches show this to be very probable, although absolute proof is still wanting. A certain degree of temperature—higher than 60° F.—seems necessary for the production of the poison. It does not exist within the arctic circle, nor does it appear in the cold seasons of temperate climates, and seldom beyond the 56° of N. lat. (Watson). It also requires moisture. In England, ague is almost exclusively confined to the eastern coast; and the extension of drainage has rendered agues far more rare than before. James I. and Oliver Cromwell died of ague contracted in London. The Pontine Marshes to the south of Rome have long been notorious as a source of aguish fevers. Peat bog, or moss, is not productive of malaria, as is seen in parts of Ireland and Scotland. Neither is ague ever seen among the inhabitants of the Dismal Swamp—a moist tract of 150,000 acres on the frontiers of Virginia and North Carolina in North America.

The treatment of ague must be considered under two heads: during the paroxysm, and in the 'interval.' It is carried out generally as follows: As ague is a specific disease, little can be done during the paroxysm, save by applying external warmth to the body during the cold stage, and by administering restoratives, should collapse occur at the end of the hot stage. During the 'interval,' after purgatives have been administered, quinine must be given with the object of breaking the recurrence of the paroxysm, and thus, if possible, preventing grave degeneration of the organs and malarial cachexia. Arsenic is also sometimes used to attain this object.

Aguesseau, HENRI FRANÇOIS D', pronounced by Voltaire the most learned magistrate that France ever possessed, was born at Limoges in 1668. As *procureur-général* of the parliament, he effected many improvements in the laws and in the administration of justice; and he displayed great benevolence during the famine of 1709. A steady defender of the rights of the people and of the Gallican Church, he successfully opposed the decrees of Louis XIV. During the regency of the Duke of Orleans, he became chancellor of France; but in 1718 he fell into disgrace by opposing Law's fatal system of finance. In 1720 he was reinstated, in 1722 was again dismissed, and did not resume the office of chancellor till 1737. He resigned in 1750, and died February 9, 1751. His works fill 13 vols. 1759-89 (2 vols. 1865).

Aguilar, GRACE, was born of Jewish parentage at Hackney, near London, in 1806, and from 1828 lived for a long time in Devonshire. She was always of delicate health, and died on 16th September 1847, at Ex. went, on her way to the baths of A. A. A. During her lifetime she published *The Magic Wreath* (1835), *Spirit of Judaism* (1841), *The Jewish Faith* (1846), &c.; and after her death appeared *Home Influence*, *A Mother's Recompense*, *The Vale of Cedars*, and three other graceful fictions.

Aguilar de la Frontera, a Spanish town of Andalusia, 26 miles SSE. of Cordova. The chief trade is in corn and wine. Pop. 11,712.

Aguilas, a fortified port in the Spanish province of Murcia, with large smelting houses, and considerable export trade in argentiferous lead, iron-ore, sulphur, esparto, and figs. Pop. 8947.

Agulhas, CAPE, the most southern point of Africa, lies about 100 miles ESE. of the Cape of

Good Hope, in lat. $34^{\circ} 49' S.$, long. $20^{\circ} 0' 40'' E.$ The point is very dangerous for ships; fogs are frequent, the currents are uncertain, and there are many rocks to seaward. In 1849, a lighthouse was erected on the point. The *Agulhas Bank* extends along the whole southern coast of Africa, from near Natal to Saldanha Bay. It has an average breadth of 40 miles, but is difficult of navigation. The waters abound in fish. *Agulhas* (Portuguese) means 'needles.'

Ahab, the son and successor of Omri, was king of Israel from 918 to 896 B.C. He married Jezebel, the daughter of Ethbaal, king of Sidon. Through his wife's influence the Phœnician worship of Baal was introduced, and the priests and prophets of Jehovah cruelly persecuted. Yet the prophets retained their influence over the people; and Elijah dared openly to attack the priests of Baal, and reprove the wickedness of the king. Ahab was a public-spirited king, with a passion for splendid buildings. Mesha, king of Moab, was tributary to him. He prosecuted two successful wars against Benhadad, king of Syria; but in a third campaign he was killed by an arrow. His daughter Athaliah was married to Jehoram of Judah. His whole family was afterwards extirpated under Jehu.

Ahasuerus is the name, or rather, perhaps, the title, by which several kings of Media and Persia are mentioned in Scripture. The best known of these is Esther's husband (see *ESTHER*), who is probably the same as the Persian king Xerxes (q.v.); the Hebrew form of his name being Achashverosh. Ahasuerus is also, according to the tradition, the name of the WANDERING JEW.

Ahaz, king of Judah from 741 to 725 B.C., according to the received chronology. Being pressed hard by the Edomites and Philistines, as well as by the kings of Israel and Damascus, he called to his aid the Assyrian king, Tiglath Pileser, sending him, as the price of his help, all the treasures of the temple and the palace. Tiglath Pileser indeed beat off his enemies, but forced Ahaz himself to do him homage at Damascus, and to pay him tribute.

Ahlquist, AUGUST ENGELBERT, Finnish philologist, was born 7th August 1826; studied philosophy and philology at Helsingfors; in 1847 founded a Finnish newspaper, the *Suomen Vapri*; travelled through Northern Russia and Siberia (1853-58); and afterwards became professor of Finnish in the university of Helsingfors. Besides grammatical and lexicographical works, he has published, in Finnish, an account of his travels, a volume of poems, and several translations from the German.

Ahmedabad (better *Ahmadabad*), chief town of a district in Guzerat, second amongst the cities of the province of Bombay, is 50 miles N.E. of the head of the Gulf of Cambay. It was built in the year 1412 by Ahmed Shah, and finally came under the power of the British in 1818. It was formerly one of the largest and most magnificent cities in the East, and last century had a population of 900,000. Its architectural relics are gorgeous, even in the midst of decay, and illustrate the combination of Saracenic with Hindû forms mainly of the Jain type. The Jama Masjid, or Great Mosque, rises from the centre of the city, and is adorned by two superbly decorated minarets. There is likewise an ivory mosque, so called because, although built of white marble, it is lined with ivory, and inlaid with a profusion of gems. There are some twelve other mosques and six famous tombs. The modern Jain temple is of singular beauty. The prosperity of the place was almost wholly destroyed by the rapacity of the Mahrattas, but it has largely recovered, and is still famous for its manufacture of rich fabrics of silk

and cotton, brocades, and articles of gold, silver, steel, and enamel. The pottery is very superior; and paper of various sorts is largely manufactured, chiefly from jute. Pop. (1881) 127,621.—The district, mainly a great alluvial plain, has an area of 3821 sq. m., and a pop. of 856,324, of whom about a tenth are Mohammedans.

Ahmednagar (*Ahmadnagar*), a town of the province of Bombay, 122 miles E. of Bombay, is the third city of the Deccan. It was founded in 1494 by Ahmed Nizam Shah. In 1797 it fell into the hands of the Mahrattas and in 1817 became British. It consists mainly of houses built of sunburnt bricks, but retains numerous specimens of Mohammedan architecture. It became a municipality in 1855; and possesses a good supply of water by means of aqueducts. Strong carpets, cotton and silk cloths, and copper and brass pots, are manufactured here. There are several smaller places of the same name in India. Pop. (1881) 37,492, almost all Hindus in faith. Area of the district, which is partly bounded by the Godavari River, 6666 sq. m.; pop. 751,228.

Ahmedpur, a meanly-built town of India, in the native state of Bahawalpur, 25 miles SW. from Bahawalpur. Estimated pop. 30,000.

Ahmed Shah, the first monarch of Afghanistan, born about 1724, was the son of Seman Khan, chief of the Abdali tribe. He served in the bodyguard of Nadir Shah (q.v.), and on his assassination, retired to Afghanistan, where he induced the native tribes to revolt and to choose him sovereign. His wealth and military talents made him popular, and he gradually so far extended his conquests that, on his death in 1773, he left to his son, Timur, an empire which reached from Khorasan to Sirhind, and from the Oxus to the Indian Sea.

Alm, JOHANN FRANZ, educationist, was born at Aix-la-Chapelle in 1796, and died 21st August 1865, having from 1824 till 1863 held various scholastic offices in his native city and at Neuss. His French Grammar for Germans (1834) has gone through more than 200 editions, and was succeeded by similar works on English, Italian, and Dutch. Alm's method—an extension of Seidenstücker's, who died in 1817—is that of making the example precede the rule, so that the pupil learns a foreign language much as, when a child, he learned his own.

Al'riman (Zend, *anra metingus*, 'dark spirit'), the evil principle, opposed to Oumaid, in the dualism of later Zoroastrianism. See ZOROASTER.

Ahwaz, a small village of Persia, in the province of Khuzistan, 70 miles N.E. of Bassora. The neighbourhood is covered with the ruins of the capital of Artabanus, the last of the Parthian kings. Since the 10th century, the town has fallen into such decay that not more than fifty families inhabit the present miserable village.

Aidan, Sr, the founder of the Northumbrian Church, was sent from Iona in 635, in answer to King Oswald's summons, to become the Bishop of Northumbria. He established himself in the island of Lindisfarne, and, thence making missionary journeys to the mainland, achieved a great work, in spite of the ravages of Penda, the heathen ruler of Mercia. He died at Bamborough, 31st August 651.

Aidé, HAMILTON, English poet and novelist, was born in 1830 at Paris, the son of an Armenian and of a daughter of Admiral Sir George Collier. He served seven years in the British army, and then settling down in the New Forest, devoted himself to literature. Among his poems are *Eleonore* (1856), and *Songs without Music* (1882); among

his novels, *Rita* (1859), *The Marston* (1868), and *Passages in the Life of a Lady* (1887).

Aide-de-camp, an officer attached to the personal staff of a general officer. He carries all orders on the field of battle, and, when thus acting as the mouthpiece of the general, is to be implicitly obeyed: the importance of clearness and accuracy is therefore manifest. In garrison and quarters, the aide-de-camp superintends the general's household, and acts as his secretary, assisting him in his correspondence, introducing military officers, and likewise aiding in dispensing the courtesies of his house. Before an officer can be appointed an aide-de-camp, he must have served two years with his regiment; an officer who has not passed the final examination at the Staff College must have passed the examination for promotion to the rank of captain, and is required to exhibit proficiency both in speaking and writing French. A major-general has one, a lieutenant-general two, and a general three aides-de-camp; in the field, four aides are allotted to the officer commanding in chief, and two to a brigadier; each receives 9s. 6d. a day in addition to the pay of his rank. There is no limit of rank, and personal intelligence and good horsemanship are generally taken into account; but in practice, officers above the rank of captain are seldom selected as aides. As nominal head of the army, the sovereign may have an indefinite number of aides-de-camp, and the office is much sought after, both as an honour, and as conferring the army rank of full colonel. In 1887 the queen had forty-one aides-de-camp, some of whom were taken from the navy and from the militia, in which cases the appointments were honorary; the military aides, however, were chosen for distinguished war services. — In the United States army, a lieutenant-general is allowed two aides and a military secretary, with the rank and pay of lieutenant colonel; three and two aides respectively are allotted to major-generals and brigadiers, selected in the former case from captains and lieutenants, in the latter from lieutenants in the army, but with no additional rank attached to their position.

Aidin (*Gazel-Hissar*), a town of western Asia Minor, on the river Meander, is the capital of a province, and was built out of the ruins of the ancient Tralles. It lies 60 miles S.E. of Smyrna by railway. The trade is important, especially in morocco leather, cotton, figs, olives, and grapes. Pop. about 30,000. •

Aids. These were originally payments to which every tenant in chivalry was liable. (1) To ransom the person of the lord when taken prisoner; (2) To make his eldest son a knight; and (3) To provide a suitable portion to his eldest daughter on her marriage. Tenants in socage were liable only to the latter two, and the mesne lords were prohibited by Magna Charta from exacting more than these three. The last feudal aid exacted was in 1346 for knighting the Black Prince. These incidents of tenure were abolished in 1672. Scutage (q.v.) and Tallage (q.v.), and the Benevoice (q.v.), were arbitrary taxes of this kind which led to disputes between English kings and their subjects down to King Edward III's reign, although the right to levy such taxes without the consent of the realm was formally renounced by the confirmation of charters by Edward I. The name of aid was, however, also applied, down to the time of William III., to parliamentary taxes for extraordinary purposes, including the land-tax. See FEUDAL SYSTEM, TAXATION.

Aigrette is the French name of the bird known in England as Egret (q.v.), the lesser white heron. Hence the term came to be used for its feathery

crest, for feathers in a lady's head-dress, and more loosely for any head-dress like a plume, a bouquet of flowers, or an ornament of precious stones. Botanically, it is equal to Pappus (q.v.), down of a seed, like thistle down.

Aigues-Mortes (*Aigue Mortue*), a small town in France (pop. about 3400) in the department of Gard. It is situated in an extensive salt-marsh, and is about 3 miles from the Mediterranean, with which it is connected by a canal. In the middle ages, when the sea came much nearer the town, it was a very important Mediterranean harbour. It was from Aigues-Mortes that St Louis sailed in 1248, and again in 1270, for the Crusades.

Aiguille (Fr., 'needle'), an instrument used by military engineers to pierce a rock for the reception of gunpowder, when any blasting or blowing-up is to be effected. The word is also used of the needle-like peaks or summits of mountains, especially in the Alps.

Aikin, JOHN, son of a Unitarian tutor, was born at Kibworth, Leicestershire, 15th January 1747, and after studying at Edinburgh and London, took his M.D. degree at Leyden University (1780). He practised in Chester, Warrington, Yarmouth, and London; but in 1798 retired to Stoke-Newington, where he died 7th December 1822. A friend of Priestley, Darwin, John Howard, and Southey, he was a voluminous author; his works including *Lives of Howard, Selden, and Usher*; the *General Biography* (10 vols. 1799-1815); and the well-known *Evenings at Home* (6 vols. 1792-95), written in conjunction with his sister, Mrs Barbauld (q.v.). — His daughter, LUCY AIKIN, was born at Warrington, 6th November 1781, and died at Hampstead, 29th January 1864. She was author of *Epistles on Women* (1810); *Lorimer, a Tale* (1814); *Memoir of John Aikin, M.D.* (1823); *Memoirs of the Courts of Elizabeth, James I., and Charles I.* (6 vols. 1818-33); and *Life of Addison* (1843). See her *Memoirs, Miscellanies, and Letters* (1864).

Aikman, WILLIAM, Scottish portrait-painter, was born at Cairnie, Aberdeenshire, in 1682, and died in London in June 1731. Intended by his father for the law, he followed the bent of his own inclination, and studied art instead in Edinburgh and Rome. Aikman settled in Edinburgh, and practised portrait-painting with success till 1723, when he was persuaded by the Duke of Argyll to remove to London. He executed many important commissions, including portraits of Gay, Thomson, John Duke of Argyll, Lady Grisel Baillie, and Allan Ramsay. His style was modelled on that of Kneller.

Ailanto (*Ailanthus glandulosa*, the 'tree of heaven'), a lofty and beautiful tree, of the natural order Simarubaceae, a sub-order of Rutaceae, a native of South-eastern Asia, was brought from China in 1751, and is now frequently planted to shade public walks in France and Italy. It has also been introduced into Germany, Britain, and the United States, but is apt to be injured by frost when young. The leaves are large and pinnate, with an odd leaflet resembling those of the ash. The tree grows very well on chalky soils, and is easily propagated. The wood is fine grained, satiny, and suited for cabinet-making, and the leaves afford nutriment to a species of silkworm (*Bombyx Cynthis*). It is sometimes known as Vernis du Japon, apparently by confusion with certain species of Rhus. •

Ailly, PIERRE D' (or Petrus de Alliaco), theologian and Nominalist philosopher, was born in 1350. Chancellor of the university of Paris, and Bishop of Compiègne, he was made cardinal in 1411, and a papal legate in Germany. He took a chief part in

the Council of Constance, where he headed the reform party, but agreed to the sentence on Huss and Jerome of Prague. He died at Avignon in 1419.

Ailsa Craig, a rocky islet of Ayrshire, 10 miles W. by N. of Girvan. Rising abruptly out of the sea to a height of 1114 feet, it forms a most striking object. It is about 2 miles in circumference, and is accessible only at one point, where the accumulation of debris has formed a rough beach. The rock may be described generally as a mass of trap, assuming in some places a distinct columnar form, with dimensions far exceeding those of the basaltic pillars of Staffa. On the NW., perpendicular cliffs rise to a height of from 200 to 300 feet; on the other sides, the Craig descends to the sea with a steep slope, covered with grass and wild-flowers, with numerous scattered fragments of rock. Till the erection of a lighthouse (1883-86), the only inhabitants were goats, rabbits, and wild-fowl; some geese, in particular, breeding in the cliffs in countless numbers. About 200 feet from the summit are some springs, and on the ledge of a crag on the eastern front, are the remains of an ancient stronghold. In 1831, the Earl of Cassilis, the proprietor of Ailsa Craig, was raised to the dignity of Marquis of Ailsa.

Aimard, GUSTAVE, the French Fenimore Cooper, was born in Paris, 13th September 1818, and shipping as a cabin-boy to America, spent those ten years of adventure in Arkansas and Mexico which furnished the themes of most of his novels. He travelled also in Spain, Turkey, and the Caucasus; in Paris, served as an officer of the Garde Mobile (1848); organised the *France-tireurs de la Presse* against the Germans (1870-71); and after some years' confinement in an asylum, died 20th June 1883. Of his very numerous novels, published between 1858 and 1878, twenty-six have been translated into English.

Ain, a French river rising in the mountains of Jura, and flowing 118 miles south-westward, through the departments of Jura and Ain, till it falls into the Rhone, 18 miles above Lyons.

Ain, an eastern department of France, separated from Savoy by the Rhone. Area, 2239 sq. m. The eastern part is mountainous, with summits 5000 to 6500 feet high. Agriculture is the chief industry, others being the silk and paper manufacture, and the making of horn articles. Bourg is the capital. Pop. (1886) 364,408.

Ainmiller, MAX EMANUEL, glass-painter, was born at Munich in 1807. He began the study of architecture, but afterwards entered the royal porcelain manufactory as decorator; and it was here that he first succeeded in overcoming the technical difficulties in the execution of glass-painting. A separate institution was now established for the art; and Ainmiller became its director. Amongst his works have been windows for the cathedral of Ratisbon (1826-33), for the church of Marienhilf (1833-38) in Munich, for Cologne Cathedral (1844-48), and for Glasgow Cathedral. He died at Munich, 8th December 1870. His name is also spelt *Ainmiller*.

Ainos, a race who were probably the first inhabitants of Japan, but who now are reduced to about 15,000, confined chiefly to the islands of Yesso and Sakhalin. They are short in stature, but strongly built, and the bodies of many are covered with short, bristly hair. They speak a language distinct from Japanese, and appear to be rapidly dying out. Their features are rather European than Mongolian. They exist principally by hunting and fishing, eating the flesh and making idols of the skins of their prey; are polygamous, live in wretched huts under their own

chiefs, and are heartily despised by the Japanese. See JAPAN; also Bickmore's *The Ainos or Hairy Men* (Lond. 1868); Miss Bird's *Unbeaten Tracks in Japan* (1880); Professor Basil Chamberlain's *Aino Studies* (1887), dealing with their language and mythology.

Ainsworth, ROBERT, lexicographer, was born at Woodvale, near Manchester, in 1660. He was educated at Bolton, and taught a school there until, about 1698, he removed to London, where he was engaged for many years in educational pursuits. In 1714 he commenced his Dictionary (Latin-English and English-Latin), which, however, was not published until 1736. He died in London, 4th April 1743. Ainsworth published five other works; but nothing keeps his memory alive except the Dictionary, which itself is now fast passing into oblivion.

Ainsworth, WILLIAM FRANCIS, an English physician, geologist, and traveller, was born at Exeter in 1807. He studied medicine at Edinburgh, and, after receiving (1827) his medical diploma, he travelled in France, and prosecuted geological investigations in the Auvergne and Pyrenean mountains. Returning to Edinburgh in 1828, he conducted the publication of the *Journal of Natural and Geographical Science*, and delivered lectures on geology. In 1832-33 he did good service against the cholera; in 1835 he was attached as physician and geologist to the Euphrates expedition under Colonel Chesney, and returned home in 1837 through Kurdistan, the Taurus, and Asia Minor. In 1838-41 he visited the East with Rassam and Russell, their chief objects being to explore the course of the Haly's, and to visit the Nestorian Christians in Kurdistan. Amongst his works are *Researches in Assyria, &c.* (1838); *Travels in Asia Minor, &c.* (1842); *The Claims of the Christian Aborigines of the Turkish Empire* (1843); and *Travels in the Track of the 10,000 Greeks* (1844). He is a member of many learned societies.

Ainsworth, WILLIAM HARRISON, was born in Manchester, February 4, 1805, and educated at the grammar-school. A solicitor's son, in his seventeenth year he was articled to a solicitor; and on his father's death in 1824, came up to London to complete his legal studies. Two years later, however, he married a publisher's daughter, and himself turned publisher for eighteen months. He had contributed some articles to magazines prior to 1822, so that his first-born was not *Sir John Chiverton* (1826), an anonymous novel, betrayed by Scott, but partly, it seems now, the work of a Mr Aston. Anyhow, his earliest hit was *Rockwood* (1834), with its vivid description of Dick Turpin's ride to York. By 1881, a period of close upon half a century, he had published no fewer than thirty-nine novels. Several of these appeared originally in *Beatty's Miscellany*, *Ainsworth's Magazine* (1842-54), and the *New Monthly*, of which he was successively editor; and seven of them were illustrated by Cruikshank viz. *Rockwood*, *Jack Sheppard* (1830), *Tower of London* (1840), *Guy Fawkes* (1841), *Miser's Daughter* (1842), *Windsor Castle* (1843), and *St James's* (1844). To these may be added his *Crofton* (1837), *Old St Paul's* (1841), and *Lancashire Witches* (1848), as possessing some intrinsic claim to literary merit. He died at Reigate, January 3, 1882.

Ain-Tab, a town of Syria, on the Sadjur, an affluent of the Euphrates, 64 miles NNE. of Aleppo. The chief trade is in hides and leather. Ain-Tab is supposed by some to be the ancient *Antiochia ad Taurum*. Pop. 20,000, composed of Turks, Greeks, and Armenians.

Air, or ASBEN, an oasis-kingdom in the north of the Soudan. Agudes (q.v.) is the capital. The

country is principally inhabited by three tribes, all Tuaregs, with some admixture of negro blood. The valleys are naturally rich in tropical vegetation, but they are poorly cultivated. Although the valleys of Air are in the region of the tropics, the climate is comparatively temperate.

Air is the name given to that compound of gases constituting the substance of our atmosphere. Formerly, all aeriform fluids were called 'airs' (oxygen being called *dephlogisticated air*); but in this sense the word 'gas' is now used. The chemical composition of air, its chief properties, and the phenomena they give rise to, will be found treated under Atmosphere; also at Air-pump, Barometer, Balloon, Gases, Storms, Wind, and other articles.

Air, in Music. See ARIA.

Air-beds, Cushions, and Pillows. An inflated bladder explains the nature of these. Air-cushions, or half-beds, pillows, and travelling-cushions, differ only in shape and size. They were first made at a moderate price after the introduction of Mackintosh cloth, an air-tight fabric consisting of two pieces of cloth united by an interposed layer of india-rubber spread on in solution. They are still made in essentially the same way, a thin sheet of vulcanised rubber being placed between the two layers of cloth, and the whole made into one fabric, so to speak, by pressure. When they are inflated, either by the mouth or by a pair of bellows, a screw stop-cock prevents the escape of air. An air-bed consists of a sack in the form of a mattress, usually divided into a number of compartments, each air-tight: a projection at one end forms a bolster. Each compartment has a valve, through which the air is blown in. Air-beds and pillows are valuable in cases of sickness, but are not so lasting or so comfortable as Water beds (q.v.) and water-pillows, which are formed of thicker material, consisting entirely of vulcanised india-rubber. The latter are, however, double the price of the former. It has been proposed to use air-beds for military purposes. If not taken good care of, they crack and become troublesome or useless. Air beds were known as early as the beginning of the 18th century, but being made of leather, were expensive.

Air-bladder, or SWIMMING-BLADDER, a sac pushed out from the alimentary canal of fishes, and discharging a respiratory or a hydrostatic function. Its origin and modifications resemble those of lungs, and in the highest fishes, Dipnoi (q.v.), the air-bladder is really a lung. Lungs, however, arise ventrally, while the air-bladder is usually dorsal, and, except in the transitional forms, not in such special connection with the circulatory system. This organ is first hinted at in Elasmobranchs, and occurs in all Ganoid and in most Teleostean fishes.



Air-bladder of Carp:

Consisting of two parts, B and C, joined by a narrow neck; A D, a canal communicating with oesophagus, E.

The original connection with the alimentary canal frequently degenerates, or may wholly disappear, as in the *Physosteli* division of the Teleostei (q.v.). In such cases, the contained air is apparently secreted from the walls of the sac. The pressure of the ribs, and the frequent presence of muscular fibres on the walls, effect alteration of volume, and a hydrostatic function auxiliary to rising and sinking is thus doubtless discharged. The organ is singularly inconstant in its occurrence, and varies greatly in

size and form. Sometimes very small, it reaches in other forms even to the tail. The sac may be double, or constricted, or provided with side chambers, and its various arrangements suggest those of lungs. Even internally, the resemblance is, in some cases, very close. The air-bladder is sometimes incased in a bony capsule, and occasionally connected with the labyrinth of the ear. The walls of the sac exhibit a more or less rich network of blood-vessels, and with the increase in the exchange of gases, definite modifications of the circulation are associated, and the air-bladder may thus become a lung. The air-bladder of fishes affords the finest kind of isinglass.

Air-cells, or preferably AIR-SPACES, in plants, are cavities containing air in the stems or leaves, which aid greatly in effecting the interchange of gases necessary for the life of the plant. They consist for the most part either of the intercellular spaces, or of cavities formed by rupture, as in grass and umbelliferous stems. In terrestrial plants they communicate with the exterior by means of the *Stomata* (q.v.). An interchange is thus established between the living cells of the plant and the outer air, and this is helped by movements due to wind, by changes of temperature, and the like. They are especially large and numerous in many Aquatic Plants (q.v.) which are partly or entirely floating—mainly owing their buoyancy to this cause.

Aird, THOMAS, minor poet, was born at Bowden, Roxburghshire, in 1802, and in 1816 passed from the parish school to the university of Edinburgh. There he made Carlyle's acquaintance; whilst, as tutor in the family of a Selkirkshire farmer, he often met Hogg, the Ettrick Shepherd. He was destined for the church, but preferred to devote himself to letters, and in 1826 published *Martineau's Tragedy, with other Poems*: in 1827, *Religious Characteristics*, a series of prose essays which Professor Wilson eulogised in *Blackwood's Magazine*. From 1835 till 1863 Aird edited the *Dumfries Herald*, a new Conservative journal. *The Devil's Dream*, his best-known poem, has a Landscapic, if not Dantesque grandeur; but Aird's poetry has never become popular. Whether the themes are colossal, as in *The Devil's Dream*, or pathetic, as in *My Mother's Grave*, there is the same clear, vigorous, picturesque word-painting. In 1845 appeared his *Old Bachelor in the Scottish Village*, a volume of tales and sketches; in 1848, a collected edition of his poems; and in 1852 he edited the select poems of David Moir ('Deba'). Aird died at Dumfries, 25th April 1876. See the Life by J. Wallace, prefixed to the fifth edition of his poems (1878).

Airdrie, a flourishing town in N.E. Lanarkshire, 2 miles E. by N. of Coatbridge, and 11 E. of Glasgow. Standing on the high-road between Edinburgh and Glasgow, near the Monkland Canal and the North British Railway, it owes its prosperity to the abundance of coal and ironstone in the vicinity, and has grown with great rapidity. The weaving of cotton goods for the Glasgow manufacturers is carried on to a considerable extent, as are also iron-founding, silk-weaving, and paper-making. It was created a market-town in 1695, and since 1832 has united with Falkirk in sending a member to parliament. Pop. (1831) 6594; (1861) 12,918; (1881) 13,363, or, with suburbs, 16,335.

Aire (ancient *Vicus Julii*), a French town in the department of Landes, on the Adour, 112 miles S. of Bordeaux. It is a bishop's seat, and has an ancient cathedral. Aire, famous in Roman times, was the capital of the Visigoths under Alaric, but is now much decayed. Pop. 3000.

Air-engine, a form of heat-engine in which air is the working substance. Captain Ericsson called his latest air-engine a *caloric-engine* (see CALORIC).

It is a well-known law, applicable to all heat-engines, that (presupposing the merely mechanical part of the machine to be perfect) the heat converted into work bears the same proportion to the total heat given to the working substance as the range of temperature bears to the *absolute* temperature of the source of heat. Thus, supposing an engine to receive steam (and the law is the same for steam, air, or *any other substance whatever*) at the temperature of 275° F., and discharge it at that of 120° F., the fraction of heat which it can

convert into work will be $\frac{275 - 120}{275 + 461}$ or about 21 per cent. of the total heat of the fluid. This proportion would be, of course, greatly reduced in practice, owing to imperfections in the machinery; but these being equally likely to occur in all prime movers, we need not consider them here. The *lowest* limit of temperature available being practically constant, fixed either by the temperature of the atmosphere, or that obtainable in a condenser, it follows that greater economy can only be looked for in the direction of increase of initial temperature. In ordinary steam-engines, in which the pressure and temperature increase simultaneously, the latter is limited by the former, which in its turn is kept, by considerations of safety, comparatively low. When, however, *superheated* steam (steam to which additional heat has been imparted without the corresponding addition of pressure) or heated air is used, the temperature is limited only by the power of the metals composing the machine to resist the destructive action of heat, or the chemical action of the fluid at that temperature. Heated air possesses the advantage over superheated steam as a motive power, that with it an explosion, in the usual sense of the word, is rendered almost impossible, and that, if one were to occur, it would be comparatively harmless. It also, of course, enables the boiler to be dispensed with.

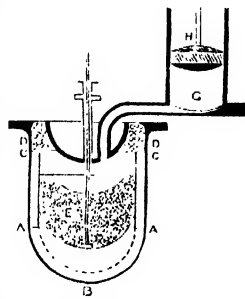
Air-engines, in their principal working parts, are very similar to ordinary steam-engines. The heated air is introduced into a cylinder, in which works a tightly fitting piston, which is thus compelled to move up and down, and transfers its motion to a revolving shaft by means of a piston and connecting-rod in the usual manner. The motion of the piston results in all cases from the expansion of the heated air; the air is heated by means of a furnace, is introduced below the piston, raises it, and then is allowed to escape into the atmosphere. Air-engines are almost invariably single-acting; they are sometimes worked simply by heated air, and sometimes with the air which, having passed through the furnace, is mixed with all the gaseous products of combustion. The latter method has the immense advantage that it utilises the heat which would otherwise be rejected into the chimney, and so prevents considerable waste of fuel.

The more heat carried away by the discharged air—the higher its temperature, in other words—the smaller evidently is, *ceteris paribus*, the range of temperature of the machine, and the less, therefore (as already explained), will be its efficiency. The distinctive principle of the Messrs Stirling's air-engine, as of the later air-engines, consists in utilising a great part of this wasted heat, and thus economising fuel. This is effected by means of a 'regenerator,' or, more properly, 'economiser,' consisting of a chamber filled with metallic sieves of wire-gauze, through which the hot air is made to pass *outwards* from the cylinder, after having

performed its work on the working-piston of the engine. As much of the heat of the escaping air is taken up by the regenerator, and its temperature thus reduced, the range of temperature of the machine is correspondingly increased. The fresh air entering the cylinder for the next stroke is compelled to pass *inwards* through the regenerator, and abstracts from it the heat left in it. In this way it does not require to receive so much heat in the furnace as would otherwise be the case, and thus economises fuel.

The figure shows one of Stirling's air-engines. E is the plunger which works in the receiver CAB.

This receiver is double, the inner lining being pierced with small holes to admit of communication between the annular space and the interior. The regenerator is placed in the space AC. By the motion of the plunger the air is alternately admitted to the upper and under portions of the receiver, passing through the regenerator. The upper portion is always in communication with G, the cylinder, in which the piston H works. At D is placed the 'refrigerator,' a coil of copper tube through which cold water passes. This refrigerator abstracts the heat wasted through imperfect action of the regenerator.



This method of preventing waste of heat was first discovered by the Rev. Dr Stirling, who obtained a patent for it in 1816. In working with air at the ordinary pressure of the atmosphere, however, the engine was found to require to be of large dimensions as compared with a steam-engine of the same power; and in order to obviate this objection, compressed air was used, the idea originating with Mr James Stirling, C.E. Several other difficulties were successfully surmounted by the Messrs Stirling, and eventually two improved engines were constructed, one of which was tested to fully 40 horse-power. This latter engine did all the work of the Dundee Foundry Company regularly for upwards of three years, during which period they employed no other motor. At the end of this period it was laid aside, principally owing to the repeated failure of one of the heating vessels.

Captain Ericsson, in his attempt to introduce his caloric engine in the ship which bore his name, experienced precisely the same difficulties and disappointments, and tried nearly the same remedies as the Messrs Stirling. There seems little doubt, however, that he actually believed his 'regenerator' was to make the *same heat* do work over and over again—to give perpetual motion—and under these circumstances it is not to be wondered at that his machines (notwithstanding some not very creditable manoeuvring on the part of their upholders) entirely failed, and that in two years (1855) they were replaced by steam-engines.

Air-engines have recently been constructed, in which the solar rays, concentrated by means of an arrangement of mirrors, are utilised as the source of heat. These have been called *solar engines*. For a very different kind of air-engine, see COMPRESSED AIR ENGINE.

Aire-sur-Lys, a fortified town in the French department of Pas-de-Calais, on the Lys, and at the junction of three canals, 37 miles W. of Lille by rail. It has one fine church, St Pierre, some cotton and woollen manufactures, and a considerable trade. Pop. 5000.

Air-gun. There are several forms of this weapon, but it is commonly made like a fowling-piece or musket, with lock, stock, and barrel. In one of the simplest kinds there is an air-chamber placed above the barrel, and the two communicate by a valve opening just behind where the bullet is placed. By means of a syringe in the stock, the air is condensed in the chamber. On pulling the trigger the valve opens, and immediately the bullet is projected with considerable force by the elasticity of the compressed air behind it. In air-guns, the reservoir of condensed air is usually very large in proportion to the tube which contains the ball, so that its elastic force is not greatly diminished by expanding through it. These guns commonly propel a bullet to a distance of from 60 to 80 yards. One form of air-gun contains several bullets in a receptacle or channel under the barrel; by the movement of a cock or lever, one of these bullets can readily be shifted into the barrel; and thus several successive discharges can be made after one loading on a principle somewhat analogous to that of the revolving pistol. Some varieties of air-guns have the condensing syringe detached, by which means greater condensation of air may be produced; this done, the air-chamber is again attached to the barrel. A pressure of as much as 500 atmospheres has been attained with a powerful condenser, but even this is only about half the elastic force of fired gunpowder. Those air-guns which present the external appearance of stout walking-sticks, and are thence called air-canes, have a chamber within the handle for containing condensed air, which can be unscrewed, and subjected to the action of the condensing syringe. The air-gun was known in France more than two centuries ago; but the ancients were acquainted with some kind of apparatus by which air was made to act upon the shorter arm of a lever, while the larger arm impelled a bullet. Among the English patents which have been taken out for peculiar forms of air-guns in comparatively recent years are the following: P. Giffard in 1872; A. Pope (H. M. Quackenbush) in 1874; G. G. Bussey in 1876; and F. Wirth (M. Weber) in 1877. Inventions for using compressed air to fire large shot with pieces of ordnance have been patented by Bessener (1867) and others.

Lieutenant Zainski of the United States Artillery invented in 1886 a large 'pneumatic gun' for throwing shells containing some of the very destructive explosives, such as nitro-gelatine. One such gun is of iron, 60 feet long, 8 inches in the bore, and $\frac{1}{2}$ inch thick. Air at 1000 lb. pressure, supplied from eight reservoirs, each 20 feet long by 12 inches in diameter, is admitted through one of the trunnions to a chamber in the gun just behind the projectile. An automatic valve, opening rapidly, permits a certain volume of the compressed air to escape into this chamber, and closes at the time the shell reaches the muzzle. By this means, with the gun at an elevation of 33 degrees, a shell containing 100 lb. of explosive material has been thrown 3000 yards.

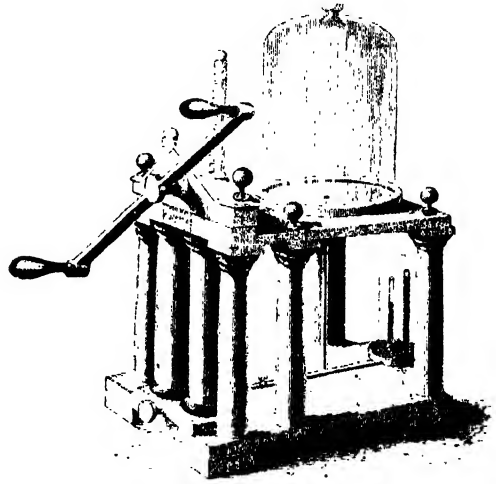
Air-lock. When hollow cylinders (*Caissons*, q.v.) of iron are used for founding the piers of bridges under water, it is now the custom to use condensed air in them, the pressure of which does not generally exceed two atmospheres beyond the ordinary atmospheric pressure. This iron shell is open at the bottom, but air-tight and water-tight at all other points; thus water is prevented from rising in it. As part of the arrangement, it is necessary to have at the top of the caisson or elsewhere a chamber, called an *air-lock*, to serve for the exit and entrance of men and materials. This comparatively small chamber has an outer and an inner door. The outer door is shut after a man

enters, and just then the air around him is at its ordinary pressure. But before the inner door is opened, the air in this chamber is compressed like that in the caisson, and he can then descend to his work.

Airolo, an Italian-Swiss village, in the upper valley of the Ticino, and 150 yards from the southern mouth of the great St Gothard Tunnel. Pop. 4000.

Air-plants. See EPIPHYTES.

Air-pump, an instrument for removing the air from a vessel. The essential part is a hollow brass or glass cylinder, in which an air-tight piston is made to move up and down by a rod. From the bottom of the cylinder, a connecting tube leads to the space which is to be exhausted. This space is usually formed by placing a bell-glass, called the receiver, with edges ground smooth, and smeared with lard, on a flat, smooth plate or table. When the piston is at the bottom of the barrel, and is then drawn up, it lifts out the air from the barrel,



Air-pump.

and a portion of the air under the receiver, by its own expansion, passes through the connecting tube, and occupies the space below the piston, which would otherwise be a vacuum. The air in the receiver and barrel is thus rarefied. The piston is now forced down, and the effect of this is to close a valve placed at the mouth of the connecting tube, and opening inwards into the barrel. The air in the barrel is thus cut off from returning into the receiver, and, as it becomes condensed, forces up a valve in the piston, which opens upwards, and thus escapes into the atmosphere. When the piston reaches the bottom, and begins to ascend again, this valve closes; and the same process is repeated as at the first ascent. Each stroke thus diminishes the quantity of air in the receiver; but from the nature of the process, it is evident that the exhaustion can never be complete. Even theoretically, there must always be a portion left, though that portion may be rendered less than any assignable quantity; and practically the process is limited by the pressure of the remaining air being no longer sufficient to open the valves. The degree of rarefaction is indicated by a *gauge* on the principle of the barometer. By means of the partial vacuum formed by the air-pump, a great many interesting experiments can be performed, illustrating the effects of atmospheric pressure, and other mechanical properties of gases. The air-pump was invented by Otto Guericke

(q.v.), 1654; and though many improvements and varieties of structure have been since devised, the principle of all is the same. Two barrels are generally used, so as to double the effect of one stroke. In some air-pumps, stop-cocks turned by the hand take the place of valves; and in others, the entrance of the connecting tube into the cylinder is so contrived that the valve through the piston is not required.

Air-sacs are outgrowths from the lungs of birds. They lie in the chest and abdominal region, are in direct connection with the branches of the bronchial tubes, and are usually nine in number. The air entering those reservoirs is warmed and moistened, while by their dilatation

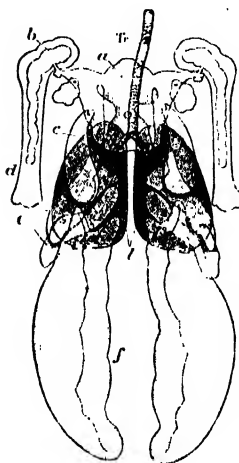


Diagram of Lungs and Air-sacs of the Pigeon :

Tr, trachea; L, lungs; a, peribronchial air-sac with its diverticula (b and c) into the humerus (d) and between the pectoral muscles; e, intermediate air-sacs; f, abdominal or posterior air-sacs.

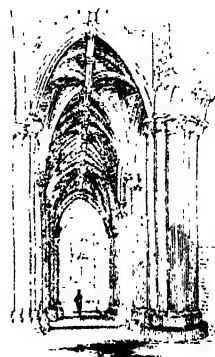
(From Claus, after Heider.)

the specific gravity of the bird can be greatly lessened; the bird in fact thus employing the principle of Montgolfier's original hot-air balloon. In most birds some of the air-sacs communicate with an extensive series of air-spaces in the bones and under the skin. Hints of these air-sacs, so characteristic of birds, are to be found in some reptiles.

Airy, SIR GEORGE BIDDELL, K.C.B., Astronomer Royal from 1836 till his retirement in 1881, was born at Alnwick, 27th July 1801. Educated at Hereford, Colechester, and Manchester grammar-school, in 1819 he went up to Trinity College, Cambridge, of which he was elected scholar (1822) and fellow (1824), having the year before come out senior wrangler. In 1826 he was elevated to the Lucasian professorship of mathematics, which he rescued from the reproach of being a sinecure, by delivering a course of public lectures on experimental philosophy; in 1828, he was made professor of Astronomy, and had the management of the newly erected Cambridge Observatory intrusted to him; and in 1836 he succeeded Pond as Astronomer Royal. By his introduction of new or more perfect scientific instruments, and of more rapid methods of calculation; by his researches in magnetism, meteorology, photography, &c. he deservedly obtained the reputation of being one of the ablest and most indefatigable of modern savants. To observe total solar eclipses, he visited Turin (1842), Gothenburg (1851), and Pöbes, in Spain (1860); he was president of the Royal Society (1871-73); and in 1871 he became a Companion (Civi) of the Bath; in 1872, a Knight Commander. Among his works have been *Astronomical Observations at Cambridge and Greenwich* (20 vols. 1829-57); *Catalogue of 2156 Stars* (1849); *Ipswich Lectures on Astronomy* (1851); *Algebraical and Numerical Theory of Errors of Observations* (1861); *Undulatory*

Theory of Optics (1866); *Atmospheric Chromatic Dispersion, as affecting Telescopic Observation* (1869); *Treatise on Magnetism* (1871); and *Notes on the Earlier Hebrew Scriptures* (1876). On his retirement in 1881, he received a pension of £1100.

Aisle (from Lat. *ala*, 'a wing') means any lateral division of any part of a church, whether attached to the nave, choir, or transept. The number of aisles varies in different churches. In England, as a rule, there is only one on each side of the nave or choir; in most foreign countries, there are frequently two, and at Antwerp and elsewhere there are three. The continental edifices, it would seem, have antiquity in their favour for this arrangement (see **BASILICA, CHURCH**). The word is often incorrectly applied to the passage in a church between the pews or seats.



Aisle - Melrose Abbey.

Aisne, a French river flowing 150 miles north-westward and westward through the departments of Marne, Ardennes, Aisne, and Oise till it falls into the river Oise, above Compiègne.

Aisne, a department in the north of France, comprising parts of Picardy, Brie, and the Isle of France. Area, 2839 sq. m. Hilly in the south, level in the north, it belongs to the basin of the Seine, and is watered by the rivers Aisne, Marne, and Oise, and by other navigable streams and canals. The soil is fertile; the chief products being grain, hay, wine, and cider. It is the seat of considerable woollen and other manufactures. Laon is the capital. Pop. (1886) 555,925.

Aiwalyk, a seaport in the north-west of Asia Minor, on the Gulf of Eubœia (Adramyti). Pop. 35,000, most of whom are Greeks. There is a considerable trade in olives and oil.

Aix, a French town, formerly the capital of Provence, in the department of Bouches-du-Rhône, 20 miles N. of Marseilles. It is believed to have been founded by the Roman consul, C. Sextius (120 B.C.), on account of the mineral springs in the neighbourhood, and thence to have got the name *Aque Sextie*. Aix is the seat of an archbishop; and possesses a college with three faculties, and a public library with 150,000 volumes and 1100 MSS. The baptistery of the cathedral is believed to have been originally a temple of Apollo. There is also an old clock-tower with a quaint mechanical clock. The industry of this again flourishing town consists chiefly in the cultivation of the olive, in cotton-spinning, leather-dressing, and trade in oil, wine, almonds, &c. The warm springs are slightly sulphurous, with a temperature from 90° to 100° F., clear and transparent as the purest well-water, almost free from smell, yet with a slightly bitter taste. The field on which Marius defeated the Teutones lies in the plain between Aix and Arles. In the middle ages, under the Counts of Provence (see **RENE**), Aix was long the literary capital of Southern Europe. Pop. (1881) 23,887.

Aix-la-Chapelle (Ger. *Aachen*), the capital of a district in Rhenish Prussia, is situated in a fertile hollow, surrounded by heights, and watered by the Wurm, 39 miles W. by S. of Cologne. Pop. (1867)

67,923; (1885) 95,321, of whom not 7 per cent. are Protestants. Aix-la-Chapelle is the centre of a valuable coal district, and of numerous thriving manufactories, especially for spinning and weaving woollen fabrics, and for needle and pin making. There are also immense manufactures of machinery, bells, glass buttons, chemicals, and cigars. As a principal station on the Belgian-Rhenish railways, Aix is an important centre of trade. The city is rich in historical associations. It emerges from historical obscurity about the time of Pepin; and Charlemagne founded its world-wide celebrity. Whether it was his birthplace is doubtful, but in 814 it became his grave. In 796 he had rebuilt the imperial palace, as well as the chapel in which Pepin had celebrated Christmas in 765. The present town house was built in 1353 on the ruins of the palace; the chapel, after being destroyed by the Normans, was rebuilt by Otto III. in 983, and forms the nucleus of the cathedral. This ancient cathedral is in the form of an octagon, which, with various additions round it, forms on the outside a sixteen-sided figure. In the middle of the octagon, a stone, with the inscription 'Carolo Magno,' marks the site of the grave of Charlemagne. In 1215 Frederick II. caused the remains of the emperor to be inclosed in a costly shrine. In the newer part of the building are kept the so-called 'great relics,' which, once in seven years, are shown to the people in the month of July, and which attract thousands of strangers in 1888. Much has of late years been done to restore this venerable pile. The columns brought by Charlemagne from the palace of the Exarch at Ravenna, to decorate the interior of the octagon, had been carried off by the French; but most of them were restored at the peace of Paris, and replaced in 1846. The town-house, adorning the market-place, is flanked by two towers older than itself, which suffered much by fire in 1883. Its coronation-hall, 162 feet long by 60 wide, in which thirty-five German emperors and eleven empresses have celebrated their coronation banquet, has been restored to its original form, and the walls have been decorated with frescoes of scenes from the life of Charlemagne. Before the town-house stands a beautiful fountain, with a bronze statue of Charlemagne. As a town, Aix-la-Chapelle has recently been much improved. It now possesses broad streets, many fine public buildings, tasteful churches, and luxurious hotels; and from being a quiet old city of historical interest, has become a busy centre of manufacturing industry.

The name of the place is derived from the springs, for which it has been always famous. *Aa* or *Anchen* is derived from *aach*, an old German word for water; the French *Aix* is the Latin *aqua*, while the *Chapelle* in the French name is the chapel of the palace. Charlemagne granted extraordinary privileges to this city. The citizens were exempted, in all parts of the empire, from personal and military service, from imprisonment, and from all taxes. In the middle ages, this free imperial city contained more than 100,000 inhabitants. The emperors were crowned in Aix-la-Chapelle from Louis the Pious to Ferdinand I. (813-1531). Seventeen imperial diets and eleven provincial councils were held within its walls. The removal of the coronations to Frankfort, the religious contests of the 16th and 17th centuries, a great fire which in 1656 consumed 4000 houses, combined with other causes to bring into decay this once flourishing community. In 1793, and again in 1794, Aix-la-Chapelle was occupied by the French. By the treaty concluded at Campo Formio and Lunéville it was formally ceded to France, until in 1815 it fell to Prussia.

The MINERAL SPRINGS of Aix-la-Chapelle, of

which six are hot, and two cold, were known in the time of Charlemagne, and have been frequented since as early as 1170. The temperature of the hot springs varies from 111° to 136° F. They chiefly act on the liver, and on the mucous surfaces and skin, and are therefore efficacious in cases of gout, rheumatism, cutaneous diseases, &c. The cold springs are chalybeate, and not so copious.

TREATIES OF PEACE and CONGRESS OF AIX-LA-CHAPELLE.—The first Peace of Aix-la-Chapelle (1668) ended the war carried on between France and Spain for the possession of the Spanish Netherlands (see LOUIS XIV.).—The second Peace of Aix-la-Chapelle (1748) concluded the war respecting the succession of Maria Theresa to the empire (see SUCCESSION, Wars of). In general, the possessions of the several states remained as before the war. Austria ceded Parma and Piacenza to the Spanish infanta, Philip; and the possession of Silesia was guaranteed to Prussia. The privilege of the *Assiento* (q.v.) was anew confirmed to England for four years, and the Pretender was expelled from France.

The Congress of Aix-la-Chapelle was held in 1818, for regulating the affairs of Europe after the war. It began on the 30th September, and ended on the 21st November. Its principal object was the withdrawal from France of the army of occupation, 150,000 strong, as well as the receiving of France again into the alliance of the great powers. The emperors of Russia and Austria, and the king of Prussia, were present in person. The plenipotentiaries were Metternich, Castlereagh and Wellington, Hardenberg and Bernstorff, Nesselrode and Capo d'Istria, with Richelieu on the part of France. The five great powers assembled signed a protocol announcing a policy known as that of the 'Holy Alliance' (q.v.).

Aix-les-Bains (*Aqua Gratiana*), a small town in the French department of Savoy, in a delightful valley near Lake Bourget, 8 miles N. of Chambéry. It was a much frequented bathing-place in the time of the Roman empire, and among its numerous remains of ancient times are the arch of Campanus, the ruins of a temple, and of a vapour-bath. The sulphurous hot springs, two in number, have a temperature of 109° and 113° F. They are used both for drinking and as baths, and attract annually 5000 visitors. Pop. 2689.

Ajaccio, since 1811 the capital of Corsica, on the west side of the island, at the head of the Gulf of Ajaccio. Transferred to its present site in 1455, it has a fine cathedral, completed in 1585, and a spacious harbour, protected by a citadel; but its special interest is as the birthplace of Napoleon. There is a statue of him as First Consul (1850), and a monument of the emperor on horseback, surrounded by his four brothers (1865). The house of the Bonapartes, the 'Casa Bonaparte,' is now national property. The chief employments are the anchovy and pearl fisheries, and the trade in wine and olive oil, which the neighbourhood produces in abundance, and of good quality. Of late years, Ajaccio has become a winter resort for consumptive patients. Pop. (1881) 17,327.

Ajaigarh, a hill-fort of India, in the North-West Provinces, 130 miles WSW. of Allahabad. Perched on a steep granite crag, it was captured by the British in 1809. Within its walls are two great masses of ruined Jain temples, covered with the most elaborate sculptures.

Ajalon, the modern *Yālo*, a town of the Levites belonging to the tribe of Dan in ancient Palestine. In a valley near it took place the battle between Joshua and five Canaanitish kings, in which it is narrated that Joshua made the sun and moon

stand still in order to 'make his victory more complete.' See Joshua, x.

A'jax, the name of two of the Greek heroes in the Trojan war: (1) Ajax the Less, son of Oileus, king of the Locrians. He led forty ships to Troy, and was famous for swiftness of foot and skill in hurling the spear. At the capture of the city he excited the anger of Pallas by an insult offered in her temple to Cassandra, and on the homeward voyage he was overtaken by the vengeance of the goddess, and swallowed up by the waves.

(2) Ajax the Greater, son of Telamon, king of Salamis, and by his mother's side a grandson of Æacus. He sailed against Troy with twelve ships, and is represented by Homer as, next to Achilles, the bravest and handsomest of the Greeks. After the death of Achilles, Ajax and Ulysses contended for the arms of the hero, and the prize was adjudged to Ulysses, which threw Ajax into such a state of rage and despair that he killed himself with his sword. This is the subject of one of the noblest of the extant tragedies of Sophocles.

Ajmere (*Ajmir*), an ancient city of Rajputana, the capital of a British district, 228 miles W. by S. of Agra by rail. It is situated in a picturesque and rocky valley, and is surrounded by a stone wall with five gateways. Many of the streets are spacious, and contain fine residences, besides several mosques and temples of very massive architecture. The Dargah or tomb of the Mussulman saint, Kwaja, within the town is held in great veneration. Trade has revived since the opening of the railway (1875), the principal export being cotton. Pop. (1881) 48,735, of whom 26,685 were Hindus, and 18,702 Mohammedans. The district of Ajmere-Mhairwara, with an area of 2711 sq. m., attains a maximum altitude of 2855 feet above sea level. Pop. (1881) 460,722, of whom 80 per cent. are Hindus.

Ajodhya, an ancient city of Oudh, on the right bank of the Gog., adjacent to Fyzabad (q.v.). Its site, which is said to have extended to 96 sq. m., is marked by heaps of ruins, overgrown with jungle; but there is a modern town, Ajodhya, with 7500 inhabitants, nearly 100 temples, 36 mosques, and the great fair of Kanneh, which yearly attracts half a million of pilgrims.

Akabah, a haven at the head of the Gulf of Akabah, the north-eastern horn of the Red Sea (q.v.). It is the ancient *Elath*, the Biblical *Elath*, a town of the land of Edom.

Akbar (i.e. 'the great,' his proper name being Jelal-ed-din-Mohammed), Mogul emperor of India, the greatest Asiatic monarch of modern times. His father, Humayun, was deprived of the throne by usurpers, and had to retire for refuge into Persia; and it was on the way thither, in the town of Amarkot, that Akbar was born in 1542. Humayun recovered the throne of Delhi after an exile of twelve years; but died within a year. The young prince at first committed the administration to a regent-minister, Bairam; but finding his authority degenerating into tyranny, he shook it off at the age of eighteen, and took the power into his own hands. At this time only a few of the many provinces once subdued by the Mongol invaders were actually subject to the throne of Delhi; in ten or twelve years, Akbar's empire embraced the whole of India north of the Vindhya Mountains, but in Southern India he was less successful. He conquered and conciliated all the independent Mohammedan and Hindu princes of Northern India from Cashmere to Behar; and although a great conqueror, was yet a greater ruler. The wisdom, vigour, and humanity with which he organised and administered his vast dominions are unexampled in the East. He

promoted commerce by constructing roads, establishing a uniform system of weights and measures, and a vigorous police. He exercised the utmost vigilance over his viceroys of provinces and other officers, to see that no extortion was practised, and that justice was impartially administered to all classes of his subjects. For the adjustment of taxation, the lands were accurately measured, and the statistics taken, not only of the population, but of the resources of each province. For a born Mohammedan, the tolerance with which he treated other religions was wonderful. He gave the Hindus freedom of worship, though he prohibited cruel ordeals and the burning of widows. He was fond of inquiries as to religious beliefs; and Portuguese missionaries from Goa were sent at his request to give him an account of the Christian faith. He even attempted to promulgate a new religion of his own, an eclectic kind of deism or natural religion; but it never took root. Literature received the greatest encouragement. Schools were established for the education both of Hindus and Mohammedans; and numbers of Hindu works were translated from Sanskrit into Persian. Abul-Fazl, the able minister of Akbar, has left a valuable history of his master's reign, entitled *Akbar-namah*. After a memorable reign of nearly fifty years, Akbar died in 1605, and was buried in a noble mausoleum at Sikandra, near Agra.

Akee' (*Cupania* or *Blighia sapida*), a fruit tree belonging to the natural order Sapindaceæ (q.v.), a native of Guinea introduced into Jamaica in the end of last century. It grows to the height of 20-25 feet or upwards, with numerous branches and alternate pinnate leaves, resembling those of the ash. The flowers are small, white, on axillary racemes; the fruit is about the size of a goose's egg, with three cells and three seeds, and its succulent aril has a grateful subacid flavour. The fruit is little inferior to a nectarine. The akee sometimes produces fruit in hot-houses in Britain. The AKI of New Zealand is a totally different plant, *Metrosideros brevifolia*, of the natural order Myrtaceæ; at first a shrub, which climbs by the aid of lateral roots, it thus attains the summit of the loftiest trees, which ultimately decay, but not until the parasite is strong enough to stand by itself.

A Kempis, THOMAS. See KEMPIS.

Akenside, MARK, poet and physician, was born in 1721, at Newcastle. The son of a butcher, at the age of seven he was accidentally lamed for life in his father's shop. He was destined for the Presbyterian Church, and in 1739 was sent to study theology at Edinburgh, but soon abandoned it for medicine. He graduated as a physician at Leyden in 1744, and practised at Northampton, then at Hempstead, and finally in London. His success as a practitioner was never very great, owing to his haughty and pedantic manner; but at Leyden he had formed an intimacy with Jeremiah Dyson, and this rich and generous friend allowed him £300 a year. He died in London, June 23, 1770, having nine years earlier been appointed one of the physicians to the queen. Some of his medical treatises possess considerable merit. He contributed verses to the *Gentleman's Magazine* as early as 1737; and in 1744 appeared his *Pleasures of the Imagination*, a didactic poem, which was begun in his 18th year, and to which is owing whatever celebrity attaches to his name, though his *Hymn to the Naiads* (1746) is his finest production. In 1772, Dyson published his poetic works, the best edition of which is that by Dyce, with Life (1834). In *Peregrine Pickle*, Smollett has sketched Akenside to the life, as the pedant who gives an entertainment after the manner of the ancients. Akenside has little originality. The reader is carried along

by the rapid and stately march of lofty images and ideas; but 'all is operose, cumbrous, and cloudy, with abundance of gay colouring and well-sounding words, filling the eye oftener than the imagination, and the ear oftener than either.' See his *Life* by Bucke (1832).

Akers. BENJAMIN PAUL, an American sculptor, born near Portland, Maine, U.S., 10th July 1825; died at Philadelphia, 21st May 1861. For a time engaged in a printing-office, he studied sculpture, and after opening a studio in Portland, executed busts of Longfellow and others. He visited Italy in 1851-2, and again in 1855. His finest works were executed at Rome, such as 'Uma and the Lion,' 'St Elizabeth of Hungary,' 'Dead Pearl-diver,' and a head of Milton; the last two of which have been described in Hawthorne's *Marble Faun*, called in *England Transformation*.

Akhalzikh', or AKISKA, a town of Russian Transcaucasia, 110 miles W. of Tiflis, on an affluent of the Kur. It is the seat of a Greek archbishopric, and maintains an active trade. Pop. (1879) 13,757, two-thirds of whom are Armenians.

Ak-Hissar. a town of Asia Minor, 52 miles NE. of Smyrna, in the valley of the Hyllus. It is the ancient *Thyatira*, where was one of the Seven Churches of Asia. The streets are paved with sculptured stones, and other relics of antiquity abound. Cotton goods and dyestuffs are exported. Pop. 12,000, of whom two-thirds are Turks, and the remainder mostly Greeks.

Akhlat, or ARDISH, a town of Asiatic Turkey, on the NW. shore of Lake Van. It is the see of an Armenian bishop, and has an old citadel. Beside it are the ruins of Chelât, a former residence of independent Armenian princes. Pop. 4000.

Akhtyrka. a town of European Russia, 58 miles NW. of Kharkoff, on a small affluent of the Dnieper. It has manufactures of tallow, candles, leather, and pottery, and a great annual fair. Pop. (1880) 17,820.

Akiba. BEN JOSEPH, a Jewish rabbi of the 2d century, who studied under Rabbi Eliezer, and was himself one of the principal fathers of the Mishna (q.v.). Born in Syria, he travelled through the empire, and became the most eminent teacher of his people and time. He systematised the Jewish traditions, and his *Mishna* of *Rabbi Eliezer* was the foundation of the religious code, although the work itself has not been preserved. Akiba entered heartily into the revolt of Bar-Cochba (q.v.), and, on the overthrow of that false Messiah, was put to death with great tortures by the Romans (135 A.D.).

Akjerman. or AKERMAN (Polish *Bielogrod*), a town of Russia, in Bessarabia, on the Black Sea, at the mouth of the Dniester, with a citadel and harbour. Soap and candles are made; fish are salted; and a good wine is grown. The treaty concluded here in 1826, between Russia and Turkey, secured to Russia the free navigation of the Black Sea, and new privileges for Moldavia, Wallachia, and Servia. Pop. (1880) 28,944—Russians, Greeks, Armenians, and Jews.

Akka, a wandering tribe of dwarfs in Central Africa, made known by Schweinfurth in 1874, and visited in 1882 by Junker. They are also called *Tiki-tiki* by their neighbours the Nyam-nyam. Their territory lies some two days' journey south of the Mombutu, west of Lake Albert Nyanza. Their average height does not exceed 4 feet 10 inches, and their projecting jaw and protruding lips give them a painfully ape-like appearance. They are timid and difficult of approach, and shun communication with strangers. They live entirely

by hunting, keeping no domestic animals but poultry.

Akkad. See ACCAD.

Akmollinsk. a province of Western Siberia, organised in 1868. Pop. (1883) 463,347. Akmollinsk, the capital, 300 miles SW. of Omsk, was founded in 1862, and has a pop. of 5700.

Akron. a town of the state of Ohio, North America, the capital of Summit County. It is situated 36 miles south of Cleveland, on the Little Cuyahoga, which falls into Lake Erie, and at the junction of the Ohio and Erie Canal with the Pennsylvania and Ohio Canal, at the highest point in the course of the former canal, whence its name (Gr., 'a summit'). It is also at the intersection of two railways. It has woollen factories, flour-mills, a steam-engine factory, a stove factory, a mineral-paint mill, and other works, the machinery of which is driven by ample water-power. Near the town are large supplies of the mineral which supplies the Ohio fire-proof paint. It was first settled in 1825. Pop. (1870) 10,006; (1880) 16,512.

Aksakof. IVAN SERGEJEVICH, a member of a Russian family of *littérateurs*, born October 7, 1823, wrote lyrics, but is best known as the representative of Slavism (q.v.). From 1880 till his death, February 8, 1886, he edited the recognised organ of his party.

Ak-shehr (*White City*), a city of Asia Minor, in the province of Konia, 5 miles S. of the salt lake of Ak-shehr. Pop. 6000.

Ak-su', a town of Chinese Turkestan, 260 miles NE. from Yarkand, on an affluent of the Tarim, and at the southern base of the Thian-shan Mountains. It was formerly the capital of a separate khanate; in 1867 it became a part of the state of Eastern Turkestan, under Yakoub Beg, but was conquered again by China in 1877. It is celebrated for its manufactures of cotton cloth and saddlery, and is much resorted to by caravans, as an entrepôt of commerce between Russia, Tartary, and China. Pop. 20,000, besides a Chinese garrison as numerous.

Akyab. a town of Burmah, the chief seaport of Aracan, is situated on the eastern side of the island of Akyab, at the mouth of the Kuladan River, 190 miles SE. of Calcutta. In 1826, being then a mere fishing-village, it was chosen for the chief station of the province, and now is a great rice port; a well-built place, with broad and regular streets, good public buildings, and a high-school (1846). Savage Island, with a lighthouse, shelters the harbour. Pop. (1868) 15,536; (1881) 33,980.—Area of district of Akyab, 5535 sq. m.; pop. (1881) 359,706.

Alabama. one of the United States of North America, extends northward from the Gulf of Mexico some 330 statute miles, Copyright 1888 in U.S. the state of Tennessee being on by J. B. Lippincott the north, Georgia on the east, Company. Florida and the Gulf of Mexico on the south, and Mississippi on the west; 30° 13' to 35° N. lat., 84° 3' to 88° 35' W. long. The seaboard has an extent of about 50 miles, excluding the shores of Mobile Bay and the minor sinuosities. The maximum breadth of the state is 202 miles. The area, as officially estimated, is 52,250 sq. m., a little more than that of England, exclusive of Wales.

The state has four strongly marked natural divisions. The southernmost portion, known locally as the Pine Woods, having an average breadth from north to south of about 125 miles, is of tertiary and quaternary formation, with a surface-covering of sandy drift. In this region are extensive forests of the yellow pine (*Pinus australis*), extremely valuable for its timber, as well as for its yield of turpentine, rosin, tar, and turpentine-oil.

Near the rivers are swamps densely timbered with valuable cypress (*Taxodium distichum*). The pine-region has for the most part a light soil. North of this coast-region comes the Cane-brake, or Black Belt, of extremely fertile cretaceous (rotten limestone) soils. A part of this belt consists of open ('bald') prairie. Good water is only procurable in some sections of this belt by means of artesian wells. Cotton is the staple product of this tract. North of the Black Belt lies the great mineral region of the state. This district is in reality the south-west terminal portion of the great Appalachian range of mountains, here, for the most part, merely broken ridges and lines of hills, among and to westward of which are found vast bodies of good coal, side by side with beds of iron-ore and limestone of enormous extent. This fact renders it certain that middle and north-east Alabama must speedily become one of the world's great centres of the production of iron. The north part of Alabama comprises a portion of the fertile valley of the Tennessee River. In the north-east, especially to the east of the river, there is a mountainous tract, a continuation of the central iron district.

The large navigable rivers, Alabama (312 miles long by survey) and Tombigbee, unite in the south-west part of the state to form the short Mobile River, which flows into Mobile Bay, near the town of Mobile. The greater part (some 18,000 sq. m.) of the state is drained by this river system. The Black Warrior is the largest affluent of the Tombigbee; and the Cahawba (115 miles long), Coosa (335 miles long), and Tallapoosa are important tributaries of the Alabama. These main streams, with some others, are in general either navigable or may be fitted for navigation, while their minor tributaries afford vast water power, as yet very imperfectly utilised. In the north, the great river Tennessee traverses the state, but its importance for navigation is lessened by the 'Muscle Shoals,' an extensive series of rocks and rapids, which can only be passed at very high water. Engineering works for surmounting these obstructions have been undertaken.

The mineral resources of the state are varied and important. Besides the valuable coal and iron deposits already noticed, Alabama has extensive beds of fine marble, statuary granite, and building stones in large variety. Some gold is mined in Cleburne and Talladega counties. Medicinal springs are found in nearly all parts of the state.

Among the leading productions of Alabama are cotton, maize, oats, wheat, and sweet potatoes. Rice and sugarcane are grown in the southern counties. Apples, peaches, grapes, figs, pears, and oranges (the latter in the south) are among the fruits successfully grown. Tobacco is cultivated in the north. In general, the soils of this state are highly fertile; but in the pine barrens, and in the mountain region, there are large tracts not naturally productive.

The climate is warm but equable, the hill country and the pine forests (except near the swampy districts) are remarkably healthful; but the fertile Black Belt is not regarded as a safe place of summer or autumnal residence for unacclimatised persons. Remittent and bilious fevers are not unfrequent in this region. The rainfall is abundant, and is well distributed throughout the year; but some of the porous limestone soils are not retentive of water, and the crops often suffer from drought. The small rivers of the central region are remarkably liable to floods or freshets.

The only seaport of Alabama is Mobile! but the approach to that town is not practicable for large ships; hence Pensacola in Florida has become the principal shipping-point for the lumber and forest products of Alabama; while Savannah in Georgia, New Orleans in Louisiana, and Charles-

ton in South Carolina, ship a large part of the cotton crop. The foreign trade in Alabama coal promises to become large.

The manufacturing interests of Alabama are rapidly developing. Pig-iron can be produced here, it is confidently asserted, more cheaply than in any other part of America. Cotton goods are largely manufactured. Much lumber is sawed in the forest region, which also affords considerable amounts of tar and naval stores. The railway system of Alabama is extensive.

Alabama was settled by the French, who established a fort on the Mobile River in 1702. The city of Mobile was founded in 1712. The French settlements were regarded as a part of the Louisiana colony until 1763, when the country was ceded to Great Britain by the Treaty of Paris. What is now Southern Alabama was ceded to Spain in 1783, and became a part of West Florida, while the rest of the country was given up to the United States, which, however, after 1803, claimed the Spanish part under the Louisiana purchase; but Spain did not concede this claim until 1819. Alabama was made a state of the Union in 1819, and seceded, with most of the other slave states, in 1861. After the civil war of 1861-65, the state passed through a long season of social and business depression; but since 1880 the outlook for Alabama is one of unusual promise.

The chief towns are Montgomery, the capital, pop. (1880) 16,714, since much increased; Mobile, 29,132; and Birmingham, the principal seat of the newly founded iron industry, pop. (1887) about 30,000.

The pop. of Alabama in 1800 was only 1250; (1830) 309,257; (1860) 964,201; (1880) 1,262,505 (about 25 persons to the square mile), of whom 662,185 were white, and 526,271 were of pure or mixed African descent.

Alabama was the name of an armed vessel of the Confederate States, which inflicted terrible injury upon the shipping of the Northern States of the American Union during the civil war. She was built by Messrs Laird & Sons at Birkenhead, and was a screw steam-sloop of 1040 tons register, built of wood, and for speed rather than strength. Captain Semmes, who was appointed commander, superintended her equipment, and was enjoined by the Confederate government to keep the destination of the vessel as secret as possible, and carefully to avoid any infringement of law which would give the British government a pretext for seizing her. The destination of 'No. 290,' as she was called, was so well concealed, that the vessel was nearly finished before it was suspected by the agents of the United States. It had heretofore been held lawful to build vessels (not being manifestly war-vessels) for a belligerent in neutral ports, and lawful to purchase guns and stores in neutral ports, though they might be for the equipment of vessels thus built. What had been held unlawful was the equipment with guns and warlike stores, of a vessel built for a belligerent in a neutral port *previous* to her leaving the neutral jurisdiction. Captain Semmes did not intend to equip his vessel at Birkenhead; but the United States minister called upon the British government to detain 'No. 290,' submitting some evidence that she was intended for a Confederate war-vessel. The British government consulted the crown lawyers, who at first thought the evidence of destination insufficient; but after some delay, an opinion favourable to the detention of the vessel was at length given. The English lawyers were of opinion that there had been no infringement of the law, but that a case had been presented which the British government was

bound to submit to a court of law. It was too late: 'No. 290' was gone. The builders, aware of the danger of a seizure, had hastened their work, and the vessel, though unfinished, under pretence of a trial trip made her way down the Mersey to Moelfra Bay, where the work remaining to be done was soon finished. On the morning of the 31st July 1862, warning having been given that she was to be seized that day, 'No. 290' steamed away from the British coast and made for Terceira, one of the Azores, where she shipped her armament and stores, and by the 24th of August was ready for sea; and now Captain Semmes produced his commission to the sailors, named the vessel the *Alabama*, and hoisted the Confederate flag. The vessel made her first capture on the 5th of September. Within eleven days of that date, she captured and burned property the value of which exceeded her own cost.

Off the American coast, the *Alabama* gave battle to the United States gunboat *Hatteras*, an old vessel, and sunk her after a few broadsides. Her subsequent history consists of a monotonous succession of captures made in different seas, her prizes being merchant-vessels incapable of resistance, which were burned, as there was no port available for the disposal of her prizes, or, when there was convincing evidence of the neutral ownership of the cargo, which did not often happen, liberated upon bond. She captured in all 65 vessels; and the value of the property she destroyed was estimated at \$4,000,000. It was, however, by the heavy insurance for war-risks to which she subjected the shipowners of the United States, and still more by the difficulty she caused them in getting freights, that the *Alabama's* career inflicted the greatest injury. After a cruise in the eastern seas, she entered, on the 11th of June 1864, the French port of Cherbourg to refit. Within a few days, the United States steamer *Kearsarge*, commanded by Captain Winslow, arrived at Cherbourg, and made a demonstration which the officers of the *Alabama* regarded and accepted as a challenge. The fight took place on Sunday, the 19th of June, outside the port of Cherbourg. Before the fight had lasted an hour, Captain Semmes found his ship was sinking, and gave orders to pull down his flag. See Admiral Semmes, *Service Afloat* (Lond. 1887).

The 'Alabama Question' was raised in the winter of 1862-63, when Mr Seward declared that the Union held itself entitled to demand full compensation for the damages inflicted on American property; and the divergence of view more than once threatened to issue in the gravest consequences to both nations. In 1871 a commission met at Washington; and by a treaty concluded there, provision was made for referring this claim to a tribunal composed of five arbitrators, of whom the Queen, the president of the United States, the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil, were each to appoint one. The tribunal met at Geneva in December 1871, and by its final award Great Britain was ordered to pay a sum of £3,229,531, this sum covering also some responsibility for the depredations of the ships *Florida* and *Shenandoah*. The claim for indirect damage to American commerce was dropped. A court of commissioners was created by congress to adjudicate on 'Alabama claims.' It is understood that the claims established to the satisfaction of the court fell considerably short of the total sum awarded by the Geneva tribunal.

Alabaster, a variety of Gypsum (q.v.) or Selenite (q.v.). Chemically, these are all forms of the hydrated sulphate of calcium (hydrated sulphate of lime). Anhydrite (q.v.) is anhydrous sulphate of calcium. Both alabaster and anhydrite

are used as ornamental stones. Alabaster, though softer, resembles marble in general appearance. When free from foreign substances, it assumes a finely grained structure, is of a pure white or delicately tinted colour, and is beautifully translucent. Of this class is the celebrated alabaster of Volterra in Tuscany. But it is often elegantly veined, striped, or spotted. Great numbers of beautiful statuettes, and ornaments of different kinds, are made of this material in Italy. It is found of good quality in Derbyshire, where it is also worked up into ornaments. Alabaster is slightly soluble in water, so that it is unsuitable for external work: but it does well for internal panelling or other decoration, the only drawback being the difficulty of finding it in large pieces.

Oriental Alabaster is a stalactitic carbonate of calcium (carbonate of lime), a mineral substance different from and harder than ordinary alabaster. It is really a variety of marble, and is found in Egypt, where it was worked in ancient times for urns, jars, and the like. The same kind of rock, which is sometimes extremely beautiful, is found in other parts of the world.

The name alabaster is said to be derived from the name of a town in Egypt where this kind of stone was abundant, and was manufactured into pots for perfumes. Such pots were called *alabastra*, even when made of other materials.

Alacoque, MARQUETTE MARIE, a French nun (1647-90), the founder of the devotion of the Sacred Heart (q.v.).

Ala Dagh ('beautiful mountain'), a range in the great tableland of Erzerum, in Turkish Armenia, to the north of the lake of Van. It attains an elevation of about 11,000 feet. On its northern slope rises the Murad, the eastern head-stream of the Euphrates.

Alagoas, a maritime province of Brazil, bounded on the N. and W. by Pernambuco. The country is mountainous in the N.W., and low, marshy, and unhealthy on the coast. The chief productions are the sugar-cane, cotton-plant, manioc or cassava, ipêcaemba, maize, rice, &c., and also timber and dye woods. Pop. (1882) 397,379. The town of Alagoas, once the capital, has 40,000 inhabitants. The present capital is the port of Maceio.

Alais, a town of the French department of Gard, situated in a fertile plain, at the base of the Cévennes Mountains, 31 miles N.W. of Nîmes by rail. It embraced the Protestant cause in the religious wars of France; and Louis XIII. and Cardinal Richelieu besieged and took it in 1629. Alais owes its prosperity chiefly to the mineral wealth of the surrounding district, which produces coal, iron, lead, zinc, and asphalt; there are large iron-foundries in the town and neighbourhood. There are also manufactures of silk and ribbons. Pop. (1881) 17,098.

Alajuela, city of the state of Costa Rica, Central America, 23 miles W.N.W. of Cartago, and a little on the western side of the watershed between the Atlantic and the Pacific. It is connected with Cartago by rail. Pop. 10,000.

Alamanni, LUIGI, Italian poet, was born at Florence in 1495, and having engaged in a conspiracy against Cardinal Giuliano, his patron, fled first to Venice, and then, on the accession of the cardinal to the papal chair, to France. In 1527 he returned to Florence. Finally, he settled in France, and was employed as a diplomatist by Francis I. and Henry II. He died at Amboise in 1556. His works (2 vols. Florence, 1839) include didactic, epic, and minor poems, much admired in their day.

Alamos, Los ('the poplars'), a town of Mexico, in the southern part of the state of Sonora, 45 miles E. of the Gulf of California. It is situated in a high and healthy, but barren plain, in a region famous for its copper and silver mines. Pop. 10,000.

Åland Islands (pronounced *Åland*), a group of some 300 small islands and rocks at the entrance of the Gulf of Bothnia, opposite Åbo, the largest being situated about 25 miles from the Swedish coast. Only 80 of them are inhabited. The inhabitants are of Swedish origin, skilful sailors and fishermen. The total population is about 16,000, of whom two thirds inhabit the largest island, called Åland, which is 18 miles in length. These islands belonged formerly to Sweden, but were finally taken possession of by Russia in 1809. The Emperor Nicholas constructed strong fortifications at Bomarsund, on the east side of the main island, which in August 1854 were destroyed by an Anglo-French force.

Alans, a nomad race, of warlike equestrian habits, belonging to the great nation of the Sarmatians. First heard of in 65 B.C., they gradually spread northwards from the Caucasus to the Don and the Volga. In 375 they were conquered and scattered by the Huns; and many of them, in 411, with the Suevi and Vandals, invaded the Spanish peninsula, and settled in Portugal, whence in 429 they were ousted by the West Goths, and passed over to Africa.

Alarcon, PEDRO ANTONIO DE, Spanish author and politician, was born at Guadix in 1833, and was intended for the church, but early devoted himself to journalism. He served as a volunteer in the Morocco campaign (1859), entered the Cortes as Liberal deputy for his native town, and worked for the restoration of the constitutional monarchy in the person of Alfonso XII., who after his accession made him a councillor. A selection of his poems and novels appeared at Madrid in 1874.

Alarcon y Mendoza, JUAN RUIZ DE, one of the most eminent of Spanish dramatists, born at the town of Tasco in Mexico, about the end of the 16th century. Little is known of his early life, but in 1622 we find him at Madrid, where he was appointed to the office of *relator* (reporter) of the royal council of the Indies. His first volume of *Comedias* appeared at Madrid in 1628; his second, at Barcelona, in 1634. Throughout his lifetime, and until his death, which took place in 1639, he was assailed in venomous lampoons by contemporary poets and dramatists. For his haughty scorn of his rivals and the public, the poet was rewarded by being neglected for generations, save by plagiarists, who found his forgotten works a safe and easy prey. He is now admitted to hold a place as a dramatist next after Calderon and Lope de Vega. His plots are ingenious, but natural; his style, chaste, but vigorous; and his works are marked throughout by rare elevation of feeling. He excelled in the heroic drama, the best specimens of this kind being *El Tejedor de Segovia*. His mastery in delineating character is shown in his character-comedies. The best known are *La Verdad Sospechosa* (imitated by Corneille in his *Menteur*) and *Las Parecidas Ogen*. Of his comedies of intrigue, the best is *Todo es ventura*. A complete edition of his comedies was published at Madrid by Hartzenbusch (1848-52), and by Garcia Ramon (2 vols. 1884).

Alaric I. (*Al-ric*, 'all rich') belonged to one of the noblest families of the Visigoths. He makes his first appearance in history in 394 A.D., as leader of the Gothic auxiliaries of Theodosius in his war with Eugenius; but after the death of the former, he took advantage of the dissensions and weakness that prevailed in the Roman empire to invade

Thrace, Macedon, Thessaly, and Illyria, devastating the country (395). Rufinus, the minister of Arcadius, appears to have sacrificed Greece in order to rescue the capital, and Athens was obliged to secure its own safety by ransom. Alaric proceeded to plunder and devastate the Peloponnesus, but was interrupted by the landing of Stilicho in Elis with the troops of the western empire. Stilicho endeavoured to hem in the Goths on the Peneus; but Alaric broke through his lines, and escaped with his prisoners and booty to Illyria, of which he was appointed governor by the Emperor Arcadius, who hoped thus to make him a peaceful subject instead of a lawless enemy (396). The eastern emperor was also rendered jealous by the interference of the western empire in his affairs. In 402 Alaric invaded Upper Italy, and Honorius, the emperor of the West, fled from Rome to the more strongly fortified Ravenna. On the way to Gaul, Alaric was met and defeated by Stilicho at Pollentia on the Tanarus; but it was not till the following autumn that the result of the battle of Verona forced him to retire into Illyria. Through the mediation of Stilicho, Alaric concluded a treaty with Honorius, according to which he was to advance into Epirus, and thence attack Arcadius in conjunction with the troops of Stilicho. The projected expedition did not take place, yet Alaric demanded indemnification for having undertaken it; and Honorius, by the advice of Stilicho, promised him 4000 pounds of gold. When, after the death of Stilicho (q.v.), Honorius failed to fulfil his promise, Alaric advanced with an army, and invested Rome, which he refused to leave till he had obtained the promise of 5000 pounds of gold and 30,000 of silver. But neither did this negotiation produce any satisfactory result, and Alaric again besieged Rome (409). He took Ostia, and so stopped the food supplies of Rome. Famine soon compelled submission; and the senate allowed Alaric to appoint Attalus, the prefect of the city, emperor instead of Honorius. But Attalus displayed so little discretion, that Alaric obliged him publicly to abdicate. The renewed negotiations with Honorius proved no less fruitless than the former, and Alaric was so irritated at a perfidious attempt to fall upon him by surprise at Ravenna, that for the third time he advanced on Rome. His victorious army entered the city on August 24, 410, and continued to pillage it for six days, Alaric strictly forbidding his soldiers to dishonour women or destroy religious buildings. The prohibition served little to mitigate the horrors of the dreadful week. When Alaric quitted Rome, it was only to prosecute the conquest of Sicily; the occurrence of a storm, however, which his ill-constructed vessels were not able to resist, obliged him to abandon the project for the time; and his death, which took place at Cosenza, in Calabria, soon after (410), prevented his resuming it. He was but 34 years of age. Legend tells that, to hide his remains from the Romans, they were deposited in the bed of the river Busento, and the captives who had been employed in the work were put to death. Rome and all Italy celebrated the death of Alaric with public festivities; and the world enjoyed a momentary repose. But Alaric himself was much less barbarous than his followers. He admired those monuments of civilisation with which the Eternal City abounded, and sought to preserve them; he checked the excesses of his fierce soldiery, and at times gave indications that the lessons of Christianity which he had learned from the Arian missionaries had not been altogether forgotten. Yet through him, the Goths learned the way to Rome.

Alaric II., eighth king of the Visigoths, succeeded his father in 484 A.D. His dominions comprised all Gaul beyond the Loire and Rhine,

and most of Spain. He was an Arian, and this gave the orthodox Clovis, king of France, an excuse for making war on the heretic. Alaric's forces were completely routed near Poitiers, and he himself was overtaken and slain by the hand of Clovis (507). See GOTHs.

Alarm, or ALARUM (from Ital. *all' arme*, 'to arms'), is originally a call to arms, or the signal for this purpose, as the loud and hurried peal of an alarm-bell. Now it is commonly used of an instrument or apparatus for awakening sleepers—generally attached to a clock. It usually consists of a hammer and bell, with an escapement that lets it free at any hour arranged, when a spring or descending weight brings the hammer to bear on the bell. The alarm-clock is set beforehand by a separate disc on the face of the clock, which revolves with the hour hand. If the clock is wanted to sound at six o'clock, the figure six on the disc is put beneath the hour hand, and when the revolution of the hour hand brings it opposite six on the clock face, the alarm goes off. There are many more or less ingenious and effective *burglar alarms*. Some are electric; in others, a string stretched behind the door fires a pistol when disturbed by any one entering. An *alarm-whistle* may be attached to a boiler, so as to warn those in charge when the water sinks below its proper level.

Alarodian, a name used by Sayce for the group of languages of which Georgian is the type. See GEORGIA, CAUCASUS.

Ala-shehr (i.e. 'the exalted city,' ancient *Philadelphia*), a city of Asia Minor, 75 miles E. of Smyrna, at the N.E. base of Mount Tmolus. It was founded by Attalus Philadelphus, king of Pergamos, about 200 B.C., and is famous as the seat of one of the Seven Churches of Asia. It is still a place of considerable importance, is the seat of a Greek archbishopric, and carries on a thriving trade in corn, tobacco, and cotton fabrics, chiefly with Smyrna, to which it is now joined by a railway. There are many interesting remains of antiquity. Pop. about 15,000, including 3000 Greeks.

Alaska, a territory of the United States, occupying the NW. portion of the North American continent, together with a great number of islands, mostly in the Pacific Ocean. It is bounded on the N. by the Arctic Ocean, on the E. by the Northwest Territories of Canada and by British Columbia; on the SW. by the Pacific Ocean, and W. by Behring Sea and the Arctic Ocean. Its land area is estimated at 530,000 sq. m. It is about as large in territory as Great Britain, Ireland, France, and Spain combined. The northern portion of Alaska, containing five-sixths of its area, consists essentially of a vast expanse of moor or tundra, broken here and there by mountain-spurs (an especially marked feature in the south), and varied by countless lakes, water-courses, and sphagnum swamps. About one-third of this region lies within the arctic circle. The winter climate is here terribly severe, and the short summers are rendered almost unendurable by clouds of mosquitoes or gnats. This region is traversed by the great river Yukon, about 2000 miles long, which is said to discharge more water into the sea than the Mississippi, and by its main tributary the Tanana, the Kuskokum, and other large streams. Its population is Inuit or Eskimo, in the north and on the coast, but Athabascan or Tlingit (Pied Indian) elsewhere. The fisheries and the trade afford subsistence to the scanty population. Commerce is here much obstructed by the shallows which border the eastern shores of Behring Sea.

A second section comprises the Aleutian Islands

(q.v.), and a great part of the peninsula of Alaska. This division is mountainous, and actively volcanic. It is very thinly peopled by the Aleuts, a race considered by many to be Asiatic rather than American. The taking of the valuable fur-bearing sea-otter is the leading pursuit here. The Pribylof Islands, in Behring Sea, are at present the most important seat in the world of the capture of the fur-seal.

South-eastern Alaska consists of a narrow strip of continental land, together with the Alexander Archipelago, lying near the mainland. This region is extremely mountainous, and has many great glaciers nearly reaching the sea. The climate on the tide-level is singularly mild for the latitude, but almost incessant rains prevail. The country is well timbered, and the waters abound in valuable fish in great variety. The natives are Indians of the Haida and Thlinket races. Alaska has a very small English-speaking white population, and a limited number of creoles, or semi-Russian natives. Gold is mined at Juneau and elsewhere. Coal, mostly of rather poor quality, is found at various points.

Agriculture can never flourish in Alaska, not because the soil is poor, but because the climate is untoward, and the country generally very rocky and broken. A few neat cattle are kept near the settlements, but the climate is so wet that sheep cannot do well. Some potatoes and a few garden vegetables are grown.

The native animals of Alaska include the reindeer, the moose, the Rocky Mountain sheep; bears of three species; wolves; red, blue, black, white, and cross foxes; the muskrat, ermine, mink, sable, lynx, beaver, wolverene, squirrel, hare, porcupine, and marmot; the sea and river otter; fur, hair, and other seals, and the walrus. The furs of Alaska (excepting those of the seal and the sea-otter) are considered inferior in quality to the Hudson Bay and Siberian furs, a fact which is probably due to climatic conditions. The fisheries are becoming very important. Among the valuable food fishes are the cod, herring, halibut, and salmon of several species. It is probable that no waters in the world are more rich in fish than those of Alaska.

The principal towns of the territory are all small, and most of them are on the coast. Among them are Sitka, the capital; Fort Wrangel; and Belkofsky, the chief depot of the trade in seal-otter furs. Uoodook, on Oonashka Island, is the seat of the Russian bishop; and Michaelofsky, or St Michael's, is the principal seat of the Yukon River trade. The territory has a governor and other officers appointed by the president of the United States.

Alaska, formerly called Russian America, was first visited by the Russians under Vitus Behring in 1741. In 1799 the whole country passed under control of the Russian America Company. In 1867 the United States purchased the entire territory from Russia for \$7,200,000 in gold.

In 1880 Alaska had a population (according to the United States census) of 33,426, of whom 4300 were whites, 1756 creoles, 2145 Aleuts, 17,617 Innuits, and the rest were Indians of various tribes or stocks. The white population has increased very largely since the census, the mining, fur-trade, and fisheries having attracted many adventurous persons to settle in the territory.

See Wardman, *A Trip to Alaska* (1885); Elliott, *Our Arctic Provinces: Alaska and the Seal Islands* (1886); H. W. Seton Karr, *The Shores and Alps of Alaska* (1887); Halleck, *Our New Alaska* (1886); Sheldon Jackson, *Alaska and the Missions of the North-west Coast*; *The Alaska Coast Pilot* (published by the United States government).

Ala-tau ('mottled'), a name given to a range of lofty mountains forming the boundary between

Turkestan and Mongolia, and the northern limit of the great tableland of Central Asia. It is made up of five sierra-like sub-ranges, the Zungarian, the Trans-Ili, the Kungei, and the Tersker Alatau, the fifth, running west, having been re-named by the Russians the Alexander Range. These are all grouped round Lake Issik-Kul (elevation, 5300 feet) as a central point. The mountains, which are principally of granite formation, range generally in elevation from 10,000 to 15,000 feet, and the loftiest peak, Khan Tengri, is 24,000 feet above the sea.

Alaternus. See BUCKTHORN.

Alatyr, a town in the Russian province of Simbirsk, on the Sura, 103 miles NW. of Simbirsk. Pop. 15,000.

Alausi, a town of Ecuador, in the province of Chimborazo, 70 miles E. of Guayaquil, at an elevation of 7980 feet above the sea. Pop. 6000.

Alava, the southern and largest, but most sparsely populated, of the three Basque provinces of Spain. The country forms a series of terraces of the Cantabrian Range, trending south to the river Ebro. The mountains are scattered through the whole province, and yield various minerals, stone, and timber in abundance. The climate is mild and salubrious. Area, 1205 sq. m. The inhabitants, who are chiefly Basques (q.v.), and in 1884 numbered 97,912, are engaged in agriculture. The soil is generally fertile, and along the Ebro fruits and wine are produced, while the other valleys yield good crops of maize and hemp. Cattle and sheep are grazed on the uplands; and a considerable quantity of iron, copper, and lead is exported in the raw state. The capital is Vittoria.

Alava, DON MIGUEL RICARDO DE, a Spanish general, born of a noble family at Vittoria in 1771. At first a supporter of Joseph Bourparie, he deserted to the winning side in 1811, and soon attracted the favourable notice of Wellington, who made him a general of brigade. Soon after the restoration of Ferdinand VII., Alava was appointed ambassador to the Hague. He returned to Spain in 1820 after the revolution, was sent as a deputy to the Cortes, and soon became a leader in the party of the *Exaltados*, voting for the suspension of the royal authority. The re-establishment of absolute monarchy in the Peninsula drove him a political refugee to Brussels and England, till, at Ferdinand's death (1833), he was recalled by the regent Maria Christina, and sent on missions to London and Paris. He refused to swear to the revived constitution of 1812, declaring that he was tired of constantly taking new oaths; accordingly in 1837 he gave in his resignation, and retired to France, where he died at Barèges in 1843.



Alb.

ancient church, newly baptised persons were obliged

Alb. or ALBE (Lat. *albus*, 'white'), the long white linen vestment worn now by priests in the Roman Catholic Church alone, but used in early times by all ecclesiastics at divine service. It differed from the more modern Surplice (q.v.), which is only a modification of it, in having narrower sleeves, and fitting more closely to the body, being bound about the waist by a cincture. At the foot and wrists were embroidered ornaments called *apparels*. In the

to wear a similar garment for eight days; and hence catechumens were called *albat*; and the Sunday after Easter, on which they usually received baptism, came to be called Dominica in Albis. See WHITSUNTIDE.

Alba (ancient *Alba Pompeia*), a very ancient city of North Italy, in the province of Cuneo, on the right bank of the Tanaro, 41 miles SW. of Alessandria by rail. Alba is an episcopal seat; the cathedral was founded in 1486. Pop. 8961.

Albacete, capital of a Spanish province, 140 miles SE. of Madrid by rail, stands in a fertile but treeless plain. It has great cattle-fairs; and was formerly noted for the manufacture of knives and other steel goods. Pop. 18,976.—The province of Albacete is partly formed from the former kingdom of Murcia, and partly from New Castile. It is generally hilly, and in some parts mountainous, some of its mountains attaining an altitude of 5000 feet; but it contains also rich plains and fertile valleys. Agriculture is in a more advanced state than in most parts of Spain. The mineral wealth of the province is considerable. The area of the province is 5972 sq. m.; pop. (1884) 222,028.

Alba Longa, the most ancient city of Latium, situated on the rocky ridge that runs along the eastern shore of the Alban Lake, between the lake and the Alban Mount. According to legendary history, it was built by Ascanius, the son of Æneas, about 300 years before the foundation of Rome, which is represented as a colony of Alba Longa. Notwithstanding this, the Romans, under Tullus Hostilius, destroyed the city, and removed the inhabitants to Rome. It seems certain that Alba Longa was an important city long before the existence of Rome, and the head of a confederation of Latin towns, and that when it was destroyed, many of its inhabitants settled at Rome. Traces of its walls may yet be seen. See ALBANO.

Alban, St. the first martyr of Britain, was born at Verulam in the 3d century, and after having long lived as a heathen, was converted to Christianity. He suffered martyrdom in 283 or 305; and his anniversary is celebrated on the 22d June. The town of St Albans (q.v.), which bears his name, is believed to stand either on the site of his birthplace, or the scene of his martyrdom.

Albani, a rich and celebrated Roman family, many members of which, from the accession of Giovanni Francesco Albani as Clemens XI. to the papal throne in 1700, filled high positions in the church. It died out in 1852. It was Cardinal Alessandro Albani (born 1692—died 1779) who formed the famous collection of objects of art in the Villa Albani, outside the Porta Salaria at Rome. It is still a rich collection, although part of it was carried off by the French. The pieces taken away were restored in 1815; but the then possessor being unable to pay for their removal to Rome, sold them to the king of Bavaria.

Albani, FRANCESCO, a painter of the Bolognese school, of the time of the Caracci, was born at Bologna in 1578, and died there in 1660. He studied, along with Guido Reni, first under Calvaert, and afterwards under Ludovico Caracci. He painted about forty-five altar-pieces; but his bent inclined him more to the representation of idyllic scenes from ancient mythology or from contemporary pastoral poetry. He had by his second wife a family of twelve children of extraordinary beauty, in whom he found exquisite models for his Venuses, Galateas, and angels' heads. His representation of the Four Seasons was often imitated.

Albani, MADAME (*née* Emma La Jeunesse), vocalist, was born at Chambly, in Canada, and, trained in music by her father, at the age of twelve

made her debut at Albany, from which she assumed the professional name of 'Albani.' She studied afterwards at Paris and Milan, and in 1870 sung at Messina with a success that has since attended her to London and Paris (1872), the United States (1874), St Petersburg (1878), Berlin (1884), &c. In 1878, she married Mr Ernest Gye, eldest son of the director of the Royal Italian Opera, London.

Albania forms the south western portion of the remaining immediate possessions of European Turkey, and extends along the western shore of the Balkan Peninsula, from the river Bojana to the Gulf of Arta. To the north it is bounded, since 1878-80, by the newly-won Montenegrin territory, including Duleigno, and by Bosnia; on the south it is separated, since 1881, from Greece by the river Arta. The eastern boundary is vaguely defined by a mountain-range, which to the north attains a maximum altitude of 7990 feet. Westward of this range lie parallel chains, inclosing on the one side long elevated valleys, and sinking on the other in terraces, down to level strips along the coast, which mostly consist of unhealthy swamps and lagoons. Pinus, to the south (its loftiest summit, 7071 feet, belongs now to Greece), is likewise flanked by isolated basins or hollows, whose western edges pass into the jagged and thick-wooded Epirote highlands. These highlands advance to the sea, forming steep rocky coasts. One promontory, the Aëroceramium, projecting in Cape Linguetta far into the sea, reaches a height of 6642 feet.

A fine climate, the heat of which is tempered by high mountains and the proximity of the sea, and a favourable soil, would seem to invite the inhabitants to agriculture; but for the most part in vain. In the north, little is cultivated but maize, with some rice and barley, in the valleys; whilst the mountain terraces are used as pastures for numerous herds of cattle and sheep. In the south there is more variety. Here the slopes of the lower valleys are covered with olives, fruit, and mulberry trees, intermixed with patches of vines and maize, while the densely wooded mountain-ridges furnish valuable supplies of timber. The plateau of Janina yields abundance of grain; and in the valleys opening to the south, the finer fruits are produced, along with maize, rice, and wheat. Even cotton and indigo might be profitably cultivated in the moist valleys, but in its present wretched condition the country can barely support its scanty population.

Upper or Northern Albania formed part of the Illyria of the Romans; Lower or Southern Albania corresponds to ancient Epirus. The inhabitants form a peculiar people, the Albanians, called by the Turks Arnauts, and by themselves Skipetars. According to Lord Strangford, 'the true Albanian part of their language, after precipitation of the foreign elements, is distinctly Indo-European, and is more closely connected with Greek than with any other Indo-European language existing or recorded. . . . My own conjecture is, that the language in its present diffusion is quite modern, that is to say, of the Roman imperial times; that, at the time of the first mention of the name, Ptolemy's Albanopolis, it was confined to a comparatively small area in the Central Pinus, one probably of many other dialects, either Epirote or Illyrian. . . . This is same work after Hahn and the people who make Achilles and Deucalion 'speak modern Albanian' (*Letters on Philological Subjects*, 1878). 'The Albanians are half-civilised mountaineers, frank to a friend, vindictive to an enemy. They are constantly under arms, and are more devoted to robbery than to cattle-rearing and agriculture. They live in perpetual anarchy, every village being at war with its neighbour, and even the several quarters of the same town carrying on mutual hostilities.

Many of them serve as mercenaries in other countries, and they form the best soldiers of the Turkish army. At one time the Albanians were all Christians; but after the death of their last chief, the hero Scanderbeg (q.v.), in 1467, and their subjugation by the Turks, a large part became Mohammedans, who distinguished themselves by cruelty and treachery towards the tribes that remained true to their old faith. The Albanians are by most writers divided tribally into Gheghs, Tosks, Ljaps, &c.; but again, to quote Lord Strangford, 'the true and intelligible division is that of religious denomination. The typical region of the Mussulmans is in the centre; that of the Latins is in the northern district; and that of the Albanians in communion with the Greek Church, corresponding fairly to Epirus, is in the south, with Janina for its capital. As a whole, the Christians of the north are Roman Catholics, devotedly attached to their church,' and bitter foes of the orthodox Montenegrians. Of the 1,400,000 Albanians of the Ottoman Empire, it is estimated that 1,000,000 are Mohammedans, 280,000 members of the Greek Church, and 120,000 Roman Catholics. There are, besides, some 250,000 Albanians in Greece; and 100,000 in Italy (Sicily mostly), whither they emigrated towards the close of the 15th century. By the treaty concluded then, in 1478, between the Turks and the Venetians, Albania became a Turkish province, which almost gained independence under Ali Pasha (q.v.), but which, during the insurrection of Greece (1821-8), returned to at least nominal allegiance to the Porte. Ten rebellions have since broken out, the last in 1883. See Von Hahn's *Albanische Studien* (1854), and his *Reise im Jahr 1863* (1870); Herguard's *Haute Albanie* (1858); Knight's *Travel in Albania* (1880); Trübner's *Grammaire Albanaise* (1887); and other works cited in the full bibliography of Meyer's *Albanische Studien* (1883).

Albano, a town of Italy, 18 miles SSE. of Rome, on the declivity of the lava-walls which encompass Lake Albano, and opposite the site of Alba Longa. It is the seat of a bishop, and is surrounded by the mansions of wealthy Romans. There are numerous remains of ancient buildings, including an aqueduct. A valuable wine is made here. Pop. 6560.

THE ALBAN LAKE, or Lago di Castello, is formed in the basin of an extinct volcano, and has a circumference of 6 miles, with a depth of 530 feet. Its surface is 961 feet above the sea level. While the Romans were at war with Veii (390 B.C.), this lake rose to an extraordinary height in the heat of summer, and diviners declared that the conquest of Veii depended upon letting off the waters of the lake. Hereupon the Romans opened a tunnel through the lava-wall which bounds it. The tunnel, which still remains and still fulfils its ancient office, is a mile in length, with a height of 7 feet, and a width of 4 feet. On the eastern bank of the lake rises Monte Cavo, the ancient Mount Albanus, 3000 feet high.

Albany, or ALBAN, an ancient name for the Highlands of Scotland, and still in some degree used to our own day. Etymologically connected with the Gaelic *alp*, 'a high hill,' and the Lat. *albus*, 'white,' it is the Gaelic form of the Cymric *Albion*, a term applied to the entire British Island in a treatise on the World, once ascribed to Aristotle. It may, indeed, be pretty safely assumed that Albion or Albany was the original name of Britain among its Celtic population; and we know that from the close of the 9th till the beginning of the 11th century, Pictavia, or the kingdom of Seone, was known as the kingdom of Alban (cf. Skene, *Celtic Scotland: a History of Ancient Alban*, 2d ed. 1887). The modern use of the name Albany

may be said to have taken its rise in an act of a Scottish council held at Scone in 1398, when the title of Duke of Albany was conferred on the brother of King Robert III., then acting as regent of the kingdom. The title, being forfeited in the son of the first holder, was afterwards conferred on Alexander, second son of King James II., in the person of whose son, John, it became extinct in 1536. Subsequently it was conferred in succession on Henry, Lord Darnley, on Charles I. in infancy, on James II. in infancy, and (as a British title) on Frederick, second son of George III. Prince Charles Stuart assumed the appellation of Count of Albany as an incognito title, and gave the title of Duchess of Albany to his legitimated daughter. The title was restored in 1881, when the queen conferred it upon Prince Leopold. (1853-84), and it now is borne by his son and namesake.

Albany is a division of the eastern province of Cape Colony, in which Grahamstown (q.v.) stands.

Albany, a city of the United States, capital of the state of New York, and seat of justice.

Albany county, stands on the west bank of Hudson River, 142 miles N. of the city of New York. 42° 40' N. lat., 73° 45' W. long. An important channel of commerce, which is further facilitated by the Erie and Champlain canals. Six important railway lines centre in this city. The older streets are irregularly laid out; the principal thoroughfares are provided with horse-railways. The city has a copious water supply, and excellent drainage and sewerage systems, and is lighted by electricity and gas furnished by private companies. Albany has a fine city-hall, a high school, one large and several small public parks, a theatre, an opera-house and a music-hall, a celebrated county-prison; Roman Catholic and Episcopalian cathedrals, and many other handsome churches; several 'academies' and private schools, a noted state normal school, a law school, a medical college; an astronomical observatory, various hospitals and infirmaries, a large United States government building, and a very costly and splendid state capitol, considered the finest building of its class in the whole republic. Three bridges and several ferries cross the river to the suburban towns of East Albany, Greenbush, and Bath. Albany has a large trade in timber, grain, and cattle. Leading articles of manufacture are farming implements, boots and shoes, bricks, wagons, clothing, flour, stoves, castings and hollow-ware, furniture, ales and beer, malt, tobacco, cigars, musical instruments, and stationers' goods. The situation of Albany at the connection of so many important railways and of two great canals with tide-water, makes it a great place for the handling or transfer of the bulky staples of inferior production. A specialty in the trade of the city is the handling of barley. It is one of the largest seats of the manufacture of cast-iron stoves and heating apparatus; and its ales and beer have long had a great celebrity. The hilly and irregular site of the town greatly facilitates drainage. The winter climate of Albany is severe for its latitude. The extensive cattle-markets of this city are situated at West Albany, where there are large railway shops. Near the site of Albany the Dutch founded a block-house and fur-trading station in 1614. The Dutch villages of Beverwyck or Fort Orange (1618) and Willenstedt (1646) were the germs of the present city. The Dutch colony was ceded to Great Britain in 1664, and the town took its present name in honour of the Duke of York and Albany, afterwards James II. of England, who received a grant of the colony. In 1686 a city charter was granted to Albany, which is thus the

oldest chartered city in the United States. In 1764 the first general congress of the English colonies assembled here. In 1807 Albany became the permanent capital of the state. For a long period the city had many of the quaint characteristics of a Dutch town. The Dutch language was the one mainly spoken throughout the 18th century, and the original architecture was entirely that of the Low Countries. At present very few relics of the colonial period remain, but many of the prominent citizens are of Dutch descent. Pop. (1800) 5349; (1830) 24,209; (1860) 62,367; (1880) 90,758, of whom about one quarter were of foreign birth.

Albany, in Western Australia, is on King George's Sound, 256 miles SSE. of Perth, by a line of railway projected in 1885. It is a place of call for P. & O. steamers.

Albany, LOUISA, COUNTESS OF, was born in 1753, the daughter of Prince Gustav Adolf of Stolberg, who fell in the battle of Lenthien (1757). A bright, merry girl of nineteen, in 1772 she was married to Prince Charles Edward, no longer 'bonny,' and no longer 'young,' but a selfish worn out sot. No children came of the marriage; and in 1780, to escape from ill usage, the countess sought refuge in a nunnery. Three years later she obtained a formal separation; and, after her husband's death (1788), she lived with the poet Alfieri (q.v.), and on his death (1803), with a French painter, Fabre; but it was by the poet's side, twenty-one years later, she was buried (1824) in the church of Santa Croce at Florence. See Reumont's *Grafia von Albany* (2 vols. Berl. 1860), and Vernon Lee's *Countess of Albany* (1884).

Albatross (*Diomedea*), a genus of web-footed birds, nearly allied to Gulls and Petrels. The strongly-webbed feet have no hind-toe or claw; the beak is as long as the head, and hooked at the point; the nostrils are borne on short horny tubes. The common or wandering albatross (*D. exulans*) is the largest of web-footed birds, measuring 4 feet in length, and from 10 up to as much as 17 feet in spread of wings. It weighs 15 to 20 pounds, or even more. The wings are, however, narrow in proportion to their length. This bird is often seen at a great distance from land, and abounds in the southern seas, particularly near the Cape of Good Hope, whence sailors sometimes call it the Cape Sheep. It often approaches very near to vessels, and is one of the objects of interest which present themselves to voyagers far away from land, particularly when it is seen sweeping the surface of the ocean in pursuit of flying fish. It seems rather to float and glide in the air, than to fly like other birds, for, except when it is rising from the water, the motion of its long wings is scarcely perceptible. It is affirmed by some to sail by setting its wings like sails, and to make headway against the wind without flapping. The plumage is soft and abundant, mostly white, dusky on the upper parts, with some of the feathers of the back and wings black. The bill is of a delicate pink, inclining to yellow at the tip. The Airsacs (q.v.) of the body are greatly developed. The albatross is extremely voracious; it feeds on fish, cuttle fish, jelly-fish, &c. but has no objection to the flesh of a dead whale, or to any kind of carrion. Only one species is said to dive. It is not a courageous bird, and is often compelled to yield up its prey to sea-eagles, and even to the larger kinds of gulls. When food is abundant, it gorges itself like the vultures, and then sits motionless upon the water, so that it may sometimes be taken with the hand. Not unfrequently, however, on the approach of a boat, it disgorges the undigested food, and thus lightened, it flies off. The albatross has great

powers of sustained flight. It often follows a ship for a considerable time, and it has been calculated that it may fly 720 nautical miles in a day. Its hoarse cry has been compared to that of the pelican, but is sometimes more suggestive of the braying of an ass. Its flesh is unpalatable. Albatrosses breed on solitary islands, like Tristan d'Acunha, and form a large, rough nest of earth, grass, and leaves. The single egg is 4 or 5 inches long, of a white colour, spotted at the larger end. It is edible, and is not unfrequently destroyed by the audacious skua. The nestling is white, the young somewhat brownish and of slow growth. There



Albatross.

are seven species. One of these, the sooty albatross (*D. fuliginosa*), chiefly found within the antarctic circle, is called by sailors the Quaker Bird, on account of the prevailing brown colour of its plumage. Albatrosses appear in great numbers towards the end of June, about the Kurile Islands and Kamchatka. The Kamchadales take them by baited hooks, blow up the entrails for floats to their nets, and make tobacco pipes and various domestic articles of the wing-bones.

Albay, a town in the south end of the Philippine island of Luzon, 2 miles from the Bay of Albay, which forms an excellent harbour. It is a place of considerable trade. Pop. 13,000.

Albemarle, the English form of *Aumale* (q.v.), in Normandy, whose first earl, Odo, received from his brother-in-law, William the Conqueror, the lordship of the Isle of Holderness, in Yorkshire. Both lordship and title reverted to the crown in the reign of Henry III.; and four times subsequently was the dukedom of Albemarle conferred on four different persons - e.g. in 1423 on Richard Beauchamp, Earl of Warwick, and in 1660 on his *soldisant* descendant, General Monk (q.v.). It expired with his son in 1688; and in 1696, the title of Earl of Albemarle was granted to Arnold Joost van Keppel (1669-1718), a devoted follower of William III. Among his descendants have been William, second earl (1732-54), soldier and diplomatist; George, third earl (1724-72), who captured Havana; and George Thomas Keppel, sixth earl (born 1799), who fought at Waterloo, and rose to be a general in 1874. Of several works by him, the most interesting is *Fifty Years of my Life* (1876).

Albemarle Sound, an inlet in the north coast of North Carolina, United States, running inland for 60 miles, with a breadth of from 4 to 15 miles. It has no great depth of water, and a narrow island at its mouth prevents the sound from being affected by the tides, the waters of which receive the Roanoke and Chowan rivers. It is connected by channels with Chesapeake Bay and Currituck and Pinnico Sounds.

Alberoni, GIULIO, cardinal and statesman, was born in 1664 at Firenzola in Parma. Though he was but the son of a poor vine-dresser, his great abilities soon attracted notice, and led to his being carried by the Duc de Vendôme, as secretary, to France and Spain. In 1713 the Duke of Parma employed him as his agent in Madrid, and here he quickly gained the favour of Philip V. of Spain. He at first made use, in carrying out his plans, of the influence of the celebrated Princess Orsini, then hoodwinked her into promoting the king's marriage with Elizabeth Farnese, whose first act after her arrival was to demand the banishment of the Princess. Alberoni now (1714) became prime minister of Spain, and was made a cardinal by Clement XI. three years later. His internal administration was liberal and wise, and he did much to develop the resources of Spain, and to encourage industry and economy, while he remodelled the army and the fleet, and increased the foreign commerce. To gratify the queen, whose ambition extended beyond the aggrandisement of her own family to the restoration of the ancient splendour of the Spanish crown, he suddenly invaded Sardinia, in violation of the Peace of Utrecht. This unexpected audacity made England, France, Austria, and Holland form, in 1719, the 'Quadruple Alliance.' But Alberoni was not dismayed. Even when the Spanish fleet in the Mediterranean was destroyed by an English one, he contemplated an extensive war by land, in which all the European powers would have been entangled. He patronised the Pretender to annoy England, and the French Protestants to annoy Louis. He sought to unite Peter of Russia and Charles XII. with him, to plunge Austria into a war with the Turks, to stir up an insurrection in Hungary, and to bring about the downfall of the Regent in France. But Philip lost courage, and concluded a treaty of peace, the chief condition of which was that the cardinal should be dismissed. He was ordered to leave Spain without delay, the queen herself consenting to his banishment. He fled to Italy, where, threatened with imprisonment by Pope Clement XI., he hid his head in a monastery at Bologna, from March 1720 till April 1721. On the death of the pope in 1721, he repaired to Rome, and took part in the election of Innocent XIII., who, like his two successors, befriended the great exile. Alberoni, however, soon retired to Piacenza, and spent his remaining years in watching over a seminary which he had founded earlier, and which he richly endowed. He died at Piacenza, June 16, 1752. See *Life* by Bersani (1862).

Albert I. (Ger. *Albrecht*), Duke of Austria and German Emperor, was the eldest son of Rudolph of Hapsburg, and was born about 1250. On his father's death the electors chose Adolphus of Nassau to succeed to the imperial throne; but the new emperor soon disgusted his subjects, and was deposed in favour of Albert, who soon after defeated his rival in a battle at Gölheim, in which he perished. Albert was crowned at Aix-la-Chapelle in 1298. He ruled with vigour and success, and reduced his unruly nobles to obedience; but was less successful in his efforts for the aggrandisement of his own family. In 1308 he subjugated a part of Switzerland, and was murdered the same year, while crossing the Renss in a boat, by his own nephew, John, whose claim to the duchy of Swabia he had refused. Four other Dukes of Austria bore the name of Albert; of whom Albert V. was elected German king in 1438, and as such was called Albert II. See AUSTRIA.

Albert, Archbishop of Magdeburg and Elector of Mainz, was younger son of the Elector of Brandenburg, and was born in 1490. In 1513 he became

Archbishop of Magdeburg, and in the following year Archbishop and Elector of Mainz. Leo X. having granted him permission to sell indulgences, Albert appointed the Dominican Tetzel as his agent, who, by the shameless manner in which he went about his work, first roused the wrath of Luther. A friend of literature, he was not originally unfriendly to reformation; but he ultimately sided strongly against the Reformers. He died in 1545.

Albert, last grand-master of the Teutonic Order, and first Duke of Prussia, was born in 1490. He was the son of the Margrave of Anspach. In 1511 he was chosen grand-master of the Teutonic Order. He threw himself into the cause of the Reformation, which had rapidly spread into Prussia and broken the last strength of the Teutonic Order, whose possessions now appeared a certain prey to Poland. Acting upon Luther's advice, he declared himself secular Duke of Prussia, and placed his land under the sovereignty of Sigismund of Poland in 1525, and the Teutonic Order tried in vain to drive him out. During the remainder of his life, Albert zealously sought to further the welfare of his duchy. He established many schools, and founded in 1544 the university of Königsberg. But conflicts with the nobles, and embittered theological disputes, saddened the close of his life. He died of the plague in 1568. See PRUSSIA, TEUTONIC KNIGHTS.

Albert, or ALBRECHT, the Pious, Archduke of Austria, born in 1559, was the third son of the Emperor Maximilian II. He was brought up at the Spanish court, and dedicated himself to the church. In 1577 he was made cardinal, in 1584 Archbishop of Toledo, and during the years 1594-96 held the office of viceroy of Portugal. He was next appointed Stadtholder of the Netherlands, where he continued, until his death, the representative of the Spanish monarch, discharging the duties of his function with a moderation unwonted among the proud pre-consuls of Spain. He abandoned his ecclesiastical profession, and in 1598 married the infanta Isabella. Albert was defeated by Maurice of Nassau in 1609, made a twelve years' truce with him in 1609, and died in July 1621 at Brussels.

Albert, PRINCE CONSORT, was born at Schloss Rosenau, near Coburg, August 26, 1819, the younger son of the Duke of Saxe-Coburg-Gotha, by his first marriage with Louisa, daughter of the Duke of Saxe-Gotha-Altenburg. After a careful domestic education, the Prince, along with his elder brother, studied at Brussels and Bonn (1836-38), where, in addition to the sciences connected with statecraft, he devoted himself with ardour to natural history and chemistry, and displayed great taste for the fine arts, especially painting and music. Gifted with a handsome figure, he attained expertness in all knightly exercises; whilst by Baron Stockmar, his mentor, he was imbued with a real interest in European politics. This gallant Prince it was that the young Queen of Great Britain selected as her partner for life. They met first in 1836, and fell in love like ordinary mortals, though the marriage had long been projected by King Leopold and Baron Stockmar. It was celebrated in London on the 10th of February 1840, when Prince Albert received the title of Royal Highness, was naturalised as a subject of Great Britain, and obtained the rank of Field-marshal. As the union proved in the highest degree a happy one, the Prince was loaded with honours and distinctions both by the Queen and the nation. The title of Consort of Her Most Gracious Majesty was formally conferred in 1842, and that of Prince Consort in 1857. Notwithstanding his high and favoured

position, he abstained, with rare prudence and tact, from undue meddling with state affairs, and thus escaped the jealousy and detraction of parties. When the Whig ministry of 1840 proposed for him the income of £50,000, as Consort of Queen Victoria, the Tories, in conjunction with the Radicals, succeeded in limiting the sum to £30,000. This appears to have been the only instance of any manifestation of party feeling with reference to the Prince. On the other hand, he opened for himself an influential sphere of action, in the encouragement and promotion of science and art, appearing as the patron of many useful associations and public undertakings. The Exhibition of 1851 owed much to his strong interest. As regards continental politics, his ruling idea was that Prussia should be supreme in Germany. Young in years, but worn out by a life of manifold activity, he died of typhoid fever at Windsor Castle, towards the midnight of Saturday, 14th December 1861. See his Life by Sir Theodore Martin (5 vols. 1874-80); and Count Vitzthum's *Reminiscences* (Eng. trans. 1887).

Alberta, one of the four provisional districts into which the North-west Territories of Canada were divided in 1882. It is bounded on the S. by lat. 49°, E. by Assiniboia and Saskatchewan, N. by lat. 55°, and W. by British Columbia. The area is about 100,000 sq. m. The SW. portion of the district southward of the Canadian Pacific Railway, contains the great cattle-ranges of Canada, and has good grass and water. At the close of 1885, there were 2,098,670 acres leased for grazing lands to 58 ranching companies and individuals. Fort MacLeod and Calgary, both thriving towns, are the two great centres for the ranchmen. The latter, the chief town, stands in a valley between the Bow and Elbow rivers, and is the trading centre for a large district. Bands of Crees, Blackfeet, and Stony Indians have been located on reserves. Coal is abundant on the Bow and Belly rivers; timber is plentiful; there are also petroleum deposits, and the Rocky Mountains and their foothills are rich in minerals.

Albert-Edward, PRINCE OF WALES, eldest son of Queen Victoria, was born at Buckingham Palace, 9th November 1841, and after a careful education under four private tutors, spent one session at Edinburgh University, a twelvemonth at Oxford, and three or four terms at Cambridge. In 1860 he visited the United States and Canada; in 1862, travelled with Dean Stanley in the East; and on 10th March 1863, married the Princess Alexandra (born 1st December 1844), eldest daughter of Christian IX. of Denmark. Of their two sons and three daughters, the eldest is Prince Albert-Victor-Christian-Edward (born at Frogmore Lodge, Windsor, 8th January 1864). The prince's recovery from a six weeks' attack of typhoid fever was celebrated on 27th February 1872 with great enthusiasm—an enthusiasm emulated by our eastern fellow-subjects on the occasion of his visit to India (1875-76). He is a Field-marshal in the British army (1875), and also in the German (1883); in 1874 he was elected Grand-master of the Freemasons; and he has constantly manifested a lively interest in exhibitions, charitable institutions, the housing of the poor, agriculture, &c. The Imperial Institute is due to his suggestion. For his titles, see WALES (PRINCE OF).

Albert Lea, a post-village in Freeborn county, Minnesota, situated on a lake of the same name, about 100 miles S. of St Paul. It is the centre of a fertile agricultural section, and contains flour-mills, grain elevators, and machine-shops. Three important railway lines centre here. Pop. (1880) 1966; (1885) 3367.

Albert Medal, a decoration which, in its original institution in 1866, was intended to reward heroic acts of mariners and others in saving life at sea. A warrant of April 12, 1867, in place of the one decoration, instituted two, called the Albert Medal of the First Class, and the Albert Medal of the Second Class. In April 1877, the Albert Medal was extended to acts of gallantry in preventing loss of life in mines, on railways, at fires, and in other perils on land. The decoration of the First Class for saving life at sea is shown in the figure, and consists of a gold oval badge enamelled in dark



blue, surrounded with a garter in bronze, with the inscription in gold raised letters. It is suspended from a dark-blue and white striped ribbon. The decoration of the First Class for saving life on land is similar, except that the enamel is red, the anchor omitted, and the word 'land' in the inscription replaces 'sea.' The ribbon is crimson and white. The badge of the Second Class differs in each case from that described by being all in bronze. A bar is attached to the ribbon as a reward for every subsequent act of bravery. Twenty years after the institution of the decoration,

there were 12 First-class and 33 Second-class holders of the medal for saving life at sea, and 15 First-class and 46 Second-class holders of that for saving life on land. ALBERT MEDAL is also the name of a distinction granted since 1864 by the Society of Arts. It was founded to reward distinguished merit in promoting arts, manufactures, or commerce; and has been conferred on many of the most notable men of science, engineers, and inventors in Britain, America, and France.

Albert Nyanza (the Little Luta N'ize of Speke), a large lake of East Central Africa, is situated in a deep rock-basin, 80 miles NW. of the Victoria Nyanza. The Albert Nyanza is of an oblong shape, and, as proved by Gessi, one of Gordon Pasha's party in 1876, is 140 miles long from N. to S., and 40 miles broad. It was surveyed by Mason Bey in the same year. On the E. it is fringed by precipitous cliffs, with isolated peaks rising 5000 feet above it. The lake itself lies 2720 feet above the sea, and 1470 feet below the general level of the country; its water is fresh and sweet, and it is of great depth towards the centre. The N. and W. shores of the lake are bordered by a massive range of hills, called the Blue Mountains, which have an elevation of nearly 10,000 feet. The existence of this vast lake first became known to Europeans through Speke and Grant in 1862. Mr (afterwards Sir) Samuel White Baker (q.v.) was the first European to visit it. After a long and toilsome journey, the intrepid traveller reached the lake at *Vacovia*, in 1° 14' N. lat., 30° 40' E. long., and named it in honour of Prince Albert, who was but recently dead. Embarking in canoes, his party coasted north-eastward, and in thirteen days arrived at Mungo, near the mouth of the Somerset River. The Albert Nyanza receives the drainage of a great equatorial mountain range, where rain falls during ten months of the year. The scenery of the lake is described as extremely beautiful. In 1887 Emin Pasha reported that he had repeatedly visited the lake, and had discovered that two rivers, the Nyusi-Misi and the Dueru, flow into it from the south-west. The latter is the largest, and contributes a considerable quantity of water to the lake all the year round. Emin Pasha is of opinion that the western part of the lake is being

gradually filled up, for an island of some size, called Tunguru, had appeared during the last five years in the north-west portion of the lake. He expresses his belief that the Albert Nyanza has been formed solely by erosion, and thinks that formerly there was probably only a large river flowing between the two ranges which lie to the east and west of the present lake. The geological formation of both ranges is the same; their altitudes differ but little, and the terrace-like character of their descent lakewards is in each case exactly alike. Salt, which is very abundant in the soil on the eastern shores, is found chiefly at Kibiro, which is the centre of a brisk trade in that commodity with the surrounding countries. In 1876 two steamers were placed by Gordon Pasha on Albert Nyanza.

Albert River, North Queensland, traverses a grassy plain, and falls into the Gulf of Carpentaria, below Burketown, after a total course of about 200 miles. It is connected by a cross branch with another nearly parallel stream, the Gregory. The climate of its basin is tropical, and the land is partly occupied for grazing purposes.

Albertus Magnus, COUNT OF BOLLSTÄDT, the great scholastic philosopher of the first half of the 13th century, was born at Lauingen, in Swabia, in 1193. After finishing his studies at Padua, he entered the lately founded order of the Dominican friars, and taught in the schools of Hildesheim, Ratisbon, and Cologne, where Thomas Aquinas became his pupil. In 1245 he repaired to Paris, where for some years he publicly expounded the doctrines of Aristotle. In 1254 he became provincial of the Dominican order in Germany. In 1260 he received from Pope Alexander IV. the bishopric of Ratisbon. But in 1262 he retired to his convent at Cologne to devote himself to literary pursuits, and here he composed many of his works. He had fallen into dotage some years before his death, which occurred in 1280. The extensive chemical and mechanical knowledge which, considering the age in which he lived, Albertus Magnus possessed, brought upon him the imputation of being a sorcerer and magician. Jammy, a Dominican, published the works of Albertus in 21 folio vols. in 1651; and some of them, as also the apocryphal *De Secretis Mulierum* attributed to him, have been published separately. The most notable are the *Summa Theologiae* and the *Summa de Creaturis*. Albertus excelled all his contemporaries in the wideness of his learning; he was not inaptly termed the *doctor universalis*. He was not so remarkable for originality; and was to the best of his ability a faithful follower of Aristotle as presented by Jewish, Arabian, and western commentators. He stood midway between Realists and Nominalists in philosophy; and did more than any predecessor to bring about that marvellous union of theology and Aristotelianism which is the basis of scholasticism. Both in physics and metaphysics he mainly repeats Aristotle. See the article SCHOLASTICISM, and works on Albertus by Sigwart (1857), D'Assailly (1870), and Bach (1881).

Albi, capital of the department of Tarn in the south of France, is built on a height near the Tarn, a tributary of the Garonne, 42 miles by rail N.E. of Toulouse. It is very old, and suffered greatly during the religious wars which devastated the land in the time of the Albigenses, who took their name from this place. Besides the usual government offices, it possesses a public library and a museum and theatre. The chief buildings are the cathedral (1282-1512), the old fortress, and the archbishop's palace. Pop. (1881) 16,914.

Albigenses is a name applied loosely to the 'heretics,' belonging to various sects, who abounded in the south of France about the beginning of the

13th century. They are heard of nearly two centuries earlier, and were usually regarded at that time as successors of the Manicheans. There were various sects, the chief being that of the Cathari (q.v.), but the name was often used loosely as including other sects adverse to the discipline of the Romish Church, such as the Waldenses. They insisted on an apostolical Christianity, and lived a simple, moral, and retired life. The simple severity of their manners earned them the popular nickname of 'the good people;' after their condemnation by Pope Calixtus II., at the council held at Toulouse in 1119, they were usually styled the 'Toulouse heretics.' The Toulouse judgment was confirmed by Innocent III. in 1139. At a council held at Lombes near Albi, in 1176, they spoke out more openly in defence and explanation of their doctrines; but in spite of this, they were accused later of dualism, of denying the dogmas of the Trinity and the death and resurrection of Jesus, and of refusing the eucharist and marriage. It should be remembered that the only accounts of them that we possess, have come to us through the medium of embittered and unscrupulous antagonists. The name arose from the circumstance that the district of Albigeois in Languedoc—now in the department of Tarn, of which Albi is the capital—was the first point against which the crusade of Pope Innocent III. (1209) was directed. The immediate pretence of the crusade was the murder of the papal legate and inquisitor, Peter of Castellan, who had been commissioned to extirpate heresy in the dominions of Count Raymond VI. of Toulouse; but its real object was to deprive the count of his lands, as he had become an object of hatred from his toleration of the heretics. It was in vain that he had submitted to the most humiliating penance and flagellation from the hands of the legate Milo, and had purchased the papal absolution by great sacrifices. The legates, Arnold, abbot of Cîteaux, and Milo, who directed the expedition, took by storm Beziers, the capital of Raymond's nephew, Roger, and massacred 20,000—some say 40,000—of the inhabitants, Catholics as well as heretics. 'Kill them all,' cried Arnold; 'God will know his own!' Simon, Count of Montfort (q.v.), who conducted the war under the legates, proceeded in the same relentless way with other places in the territories of Raymond and his allies. Of these, Roger of Beziers died in prison, and Peter I. of Aragon fell in battle. The conquered lands were given as a reward to Simon of Montfort, who never came into quiet possession of the gift. At the siege of Toulouse (1218), he was killed by a stone, and Counts Raymond VI. and VII. disputed the possession of their territories with his son. But the papal indulgences drew fresh crusaders from every province of France to continue the war. Raymond VII. continued to struggle bravely against the legates and Louis VIII. of France, to whom Montfort had ceded his pretensions, and who died during the war in 1226. After thousands had perished on both sides, and the finest parts of Provence and Upper Languedoc had been devastated, a peace was concluded in 1229, at which Raymond purchased relief from the ban of the church by immense sums of money, gave up Narbonne and several lordships to Louis IX., and had to make his son-in-law, the brother of Louis, heir of his other possessions. These provinces, hitherto independent, were thus, for the first time, joined to the kingdom of France; and the pope sanctioned the acquisition, in order to bind Louis more firmly to the papal chair, and induce him more readily to admit the Inquisition. The heretics were handed over to the proselytising zeal of the order of Dominicans and the bloody tribunals of the Inquisition; and both used their utmost power to bring the recalcitrant Albigenes to the stake, and

also, by inflicting severe punishment on the penitent converts, to inspire a wholesome dread of re-incurring the displeasure of the church. From the middle of the 13th century, the name Albigenes gradually disappears. The remnants of them took refuge in the east, and settled in Bosnia, but there also they soon became extinct.

Compare Faber, *Inquiry into the History and Theology of the Vallenses and Albigenes* (Lond. 1838); Hahn, *Geschichte der Ketzer im Mittelalter* (1845); Schmidt, *Histoire et Doctrine de la Secte des Cathares ou Albigeois* (1819); and Peyrat, *Histoire des Albigeois* (2 vols. Par. 1882).

Albinos (Portuguese, from Lat. *albus*, 'white')—called also Lencoeethiopes, or white negroes, and by the Dutch and Germans Kakerlaken—were at one time considered a distinct race; but closer observation has shown that the same phenomenon occurs in individuals of all races, and that the peculiar appearance arises from an irregularity in the skin, which has got the name of *leucopathy* or *leucosis*. It consists in the absence of the colouring matter which, in the normal state, is secreted in the deepest layer of the cuticle, and also of the dark pigment of the eye; so that the skin has a pale, sickly white colour, while the iris of the eye appears red, from its great vascularity. As the pigment in the coats of the eye serves to diminish the stimulus of the light upon the retina, albinos generally cannot bear a strong light; on the other hand, they see better in the dark than others. The colouring matter of the hair is also wanting in albinos, so that their hair is white. All these differences are of course more striking in the darker varieties of the species, and most of all in the negro albinos. Albinism is always born with the individual, and occurs not only in men, but also in other mammalia, in birds, and probably in insects. It is not improbable that the peculiarity may to some extent be hereditary. The opinion that albinos are distinguished from other men by weakness of body and mind, is completely refuted by facts.

Albion, the ancient name of the island of Britain. See ALBANY.

Albion, a town of Michigan, U.S., on the Kalamazoo River, 96 miles W. of Detroit, is the centre of a grain district, and contains several large flour-mills and manufactories of agricultural implements. It is also the seat of a Methodist college, with over 300 students. Pop. (1880) 2716; (1887) about 3400.

Albion Metal. See ALLOW.

Alboin, the founder of the Lombard dominion in Italy, succeeded his father in 561 A.D. as king of the Lombards, who were at that time settled in Pannonia. His thirst for action first showed itself in aiding Narses against the Ostrogoths; and afterwards, in a war with the Gepide, whom he, in conjunction with the Avars, defeated in a great battle (566), slaying their king Krimmond with his own hand, and marrying his daughter Rosamond. Report brought back by some of his warriors, who had accompanied Narses into Italy, determined Alboin, in 568, to invade it with his own nation of Lombards, the remains of the Gepide, and 20,000 Saxons. He soon overran and subdued the country as far as the Tiber, fixing his principal residence at Pavia, which long continued to be the Lombard capital; but in 574 his cruelty cost him his life. During a feast at Verona, he made his queen drink out of the skull of her father, which he had turned into a wine-cup; and she, in revenge, invited her paramour to murder him. Strangely enough, Alboin was a just and beneficent ruler. He was beloved by his subjects, whom he stimulated into that fierce energy which characterised their descendants for ages. For several centuries his name continued

famous among the Teutonic nations, who celebrated his praises in martial songs. To escape the fury of the Lombards, Rosamund fled with her associate and the treasure to Longinus, the exarch, at Ravenna. Longinus becoming a suitor for her hand, she administered poison to her paramour, who, discovering the treachery, caused her to swallow the remainder of the cup, and share his death.

Albornoz, GIL ALVAREZ CARILLO, born at Cuena, in Spain, in 1300, studied at Toulouse, and became Archbishop of Toledo. He took part in the wars against the Moors, saved the life of Alfonso XI. of Castile in battle, and commanded at the siege of Algeciras, where the king dubbed him knight. On account of the Christian boldness with which he denounced the criminal excesses of Peter the Cruel, he had to flee to Pope Clement VI. at Avignon, who made him a cardinal. Innocent VII. sent him as cardinal-legate to Rome; and Pope Urban V. appointed him legate at Bologna in 1367. In the same year he died, and his remains were carried to Toledo for burial.

Albuc'ra, in the Spanish province of Estremadura, an insignificant hamlet, famous for the sanguinary battle of May 16, 1811, between the combined English, Spanish, and Portuguese forces under General Beresford, and the French under Marshal Soult, who were scarcely so numerous, but had abundant artillery. Soult's object was to compel the English to raise the siege of Badajoz, but he was obliged to retreat to Seville, with the loss of 9000 men; whilst the allied forces lost about 7000.

Albuc'ra (Arabic, 'the lake'), a lake near Valencia, in Spain, about 10 miles in length and the same in breadth, divided from the sea by a narrow tongue of land; a canal connects it with the city of Valencia. It is rich in fish and fowl. The revenues of the domain were granted by the Spaniards to Wellington.

Albugo is a term employed in Surgery to designate the white opacity that often follows ulceration of the cornea of the eye. In infancy, the comparatively rapid interchange of materials will often diminish to a great extent both the extent and density of these spots; but in after-life they do not undergo similar absorption, nor are they amenable to surgical relief. The disease is also called *Leucoma*.

Albula, a pass and mountain stream in the Swiss canton of Grisons. The pass (elevation, 7595 feet) is a marshy plateau, three-fourths of a mile long, with granite and limestone summits towering on either side of it. The stream rises close by, and after a course of 20 miles, broken by numerous picturesque waterfalls, it joins a tributary of the Rhine.

Album (Lat., 'white'), amongst the Romans, was a white tablet overlaid with gypsum, on which were written the *Annales Maximii* of the pontifex, edicts of the pretor, and rules relative to civil matters. It was so called, either because it was composed of a white material, or because the letters used were of that colour. In the middle ages, the word was used to denote any list, catalogue, or register, whether of saints, soldiers, or civil functionaries. In the universities on the Continent, the list of the names of the members is called the album. But its popular signification in modern times is that of a book for containing photographs, or a blank book for a drawing-room table, and intended to receive inglorious pieces of verse, or the signatures of distinguished persons, or sometimes merely drawings, prints, marine plants, postage stamps, and the like. Another modern use of the

word is as applied to collections of engravings of specimen pictures of distinguished artists—as a Murillo album, or a Rembrandt album.

Albumen is a term used in Physiological Chemistry and in Botany in distinct senses: (a) A definite proteid substance (now frequently spelt *Albumin*, so as to agree in form with the other organic compounds), containing carbon, hydrogen, oxygen, nitrogen, and a small percentage of sulphur, coagulable by heat, mineral acids, alcohol, ether, tannic acid, &c., and existing in animals in white of egg and blood serum, and in plants in seeds and elsewhere (see ANIMAL CHEMISTRY, PROTEIDS). It is the sulphur of the albumen that blackens silver when brought in contact with eggs, and the smell of rotten eggs arises from the formation of sulphuretted hydrogen during their decomposition. The property of coagulating with heat at about 160° F. (71° C.) adapts albumen for the purpose of clarifying in sugar-refining and other processes. The albumen is added to the liquid in the cold state, allowed to mix thoroughly therein, and then, when heated, it coagulates, entangling and separating all the impurities suspended in the liquid. In cooking, the juiciness of a steak or roast depends largely on the proteid substances, coagulated by the sudden application of heat, preventing the evaporation of the juices of the meat during the subsequent slow heating required to fit it for the table. With many metallic salts, such as bichloride of mercury (corrosive sublimate), sulphate of copper (blue vitriol), acetate of lead (sugar of lead), and nitrate of silver (lunar caustic), it forms insoluble compounds, and is therefore used as an antidote to these poisons. A paste made by mixing albumen with slaked lime, sets, in a short time, to a mass of stony hardness, and, in virtue of this property, makes an admirable cement for broken earthenware, or other purposes. The importance of albumen as an article of diet will be discussed under Food.

(b) A botanical term, without chemical significance, applied to the store of various reserve nutritive materials laid up for the use of the embryo within the seed. The term is only applied to the nutritive tissue when it is stored apart from the embryo proper, either within the embryo-sac (*endosperm*), or round about it (*perisperm*). Seeds which have abundant nutritive reserves containing proteids, &c., may still be 'exalbuminous' when the nutritive matter is stored within the embryo itself, as in the common pea. The characters of the albumen are important in botanical diagnosis. It is sometimes very small, as in the nettle; in other instances, on the contrary, it is very much larger than the embryo, as in the cocoa-nut, of which it forms the edible part. It is sometimes *mealy* or *farinaceous*, as in the cereals; *oily*, as in the poppy; *horny*, as in coffee; *cartilaginous*, as in the cocoa-nut; *mucilaginous*, as in the mallow. Vegetable ivory is the albumen of a palm (*Phytelphas*) which grows on the banks of the Magdalena in Colombia, and is used in place of ivory. It is thus the albumen which makes many seeds valuable for edible and other purposes, though others, no less valuable, have the nutritive materials stored within the embryo. See OVULE, SEED.

Albuminuria is a name for Bright's disease of the kidneys (see BRIGHT'S DISEASE); but albumen occurs in the Urine (q.v.) of perfectly healthy persons, and varies according to circumstances. (See G. Stewart in *Proc. Roy. Soc. Ed.* 1887).

Albuniol, a small town of Spain, 40 miles S.E. of Granada, near the coast of the Mediterranean. Pop. 8925.

Albuquerque, a town of Spain, 24 miles N. of Badajoz, near the Portuguese frontier. It stands

on an eminence, and is defended by a strong fortress. Pop. 7214.

Albuquerque. AFFONSO D', 'the Great,' viceroy of the Indies, was born in 1453, near Lisbon. In that age, the Portuguese people were distinguished for heroism and a spirit of adventure. They had discovered and subjugated a great part of the western coast of Africa, and were beginning to extend their dominion over the seas and the people of India. Albuquerque being appointed viceroy of these new possessions, landed on the Malabar coast in 1503, with a fleet and some troops; conquered Goa, which he made the seat of the Portuguese government, and the centre of its Asiatic commerce; and afterwards Ceylon, the Sunda Isles, the peninsula of Malacca, and (in 1515) the island of Ormuz at the entrance of the Persian Gulf. When the king of Persia sent for the tribute which the princes of this island had formerly rendered to him, Albuquerque presented bullets and swords to the ambassador, saying: 'This is the coin in which Portugal pays her tribute.' He made the Portuguese name profoundly respected among the princes and people of the East; and many of them, especially the kings of Siam and Pegu, sought his alliance and protection. He maintained strict military discipline, was active, far-seeing, wise, humane, and equitable, respected and feared by his neighbours, while beloved by his subjects. His virtues made such an impression on the Indian peoples, that long after his death they resorted to his grave to implore his protection against the misgovernment of his successors. Yet he did not escape the envy of courtiers and the suspicions of his king, who appointed Sorez, a personal enemy of Albuquerque, to supersede him as viceroy. This news reached him just as he was leaving Ormuz, and gave a severe shock to his shattered health. A few days after, he died at sea near Goa, December 16, 1515. His *Commentaries* were translated by Birch for the Hakluyt Soc. (3 vols. 1875-80).

Alburnum. or SAP WOOD, is the youngest and most external portion of the wood of ordinary dicotyledonous trees. It is still imperfectly hardened, and lies between the *Bark* (q.v.) and the *heart-wood* or *Duramen* (q.v.). There is often a very marked division between it and the duramen, in trees whose age is such that the latter has been perfected. The alburnum differs from the duramen in having its tubes readily permeable by fluids (see SAP). It gradually hardens, and is transformed into duramen, new layers being added externally. It is almost always of a white or very pale colour, whilst in many trees the duramen is highly coloured. The alburnum is pale even in ebony, in which the duramen is black. In general, the alburnum is much inferior in value to the hardened or perfected wood, and the different proportions which they bear to each other in the thickness of the stem, go far to determine the relative values of some kinds of trees. These proportions, however, are different not only in trees of different kinds, but in trees of the same kind at different ages. When there is a great proportion of alburnum, the wood dries slowly, and with difficulty, owing to the quantity of sap it contains. It is also more liable to decay.

Alca and Alcade. See AUK.

Alceus OF MITYLENE, one of the greatest lyric poets of Greece, flourished about 600 B.C. Most of his odes, in the Æolic dialect, are occupied with his grief for the dissensions of his country, his hatred of tyrants, his own misfortunes, and the sorrows of exile; in some he celebrates the praises of love and wine. He is said to have been an admirer of Sappho, who was a contemporary.

Alceus himself took part in the civil war, first as the coadjutor of Pittacus, but afterwards against him, when he proved a tyrant. Being banished from Mitylene, he endeavoured, at the head of the other exiles, to force his way back; but in this attempt he fell into the hands of Pittacus, who, however, granted him his life and freedom. He was the inventor of the Alcaic verse, which Horace, the happiest of his imitators, transplanted into the Latin language (see METRE). Of the ten books of Alceus's odes, only fragments remain, which are collected in Bergk's *Poeta Lyrici Graeci* (4th ed. Leip. 1878).

Alcala' de Guadaira, a town of Spain, 9 miles E. by S. from Seville by rail. It stands near the Guadaira, is beautifully situated, and owing to its fine climate, is a favourite summer resort. It is celebrated for producing the finest bread in Spain. Seville is chiefly supplied from it. Pop. 8298.

Alcala' de Henares, a town in Spain, Cervantes's birthplace, on the Henares, 21 miles E. of Madrid by rail. It once boasted of a university, founded by the famous Cardinal Ximenes in 1510, which enjoyed a European fame, and was attended by thousands of students. It was removed to Madrid in 1836, and the town is now not a shadow of its former self. Here was printed in 1517, in six folio volumes, at an expense of 80,000 ducats, the great Complutensian Bible, a monument of the piety and learning of the great cardinal. The chief buildings are the Colegio de San Ildefonso, the seat of the ancient university; its chapel containing the founder's tomb; the archbishop's palace; the cathedral; and the church of Santa Maria, in which Cervantes was baptised, October 9, 1547. The house in which he was born is marked by an inscription. Pop. 12,317. The *Complutum* of the Romans, the town owes its modern name to the Moors, under whom it was *Al Kalat*, 'the castle.'

Alcala' la Real ('the royal castle'), a city of Andalusia, Spain, in the province of Jaen, and 26 miles NW. of Granada. It is situated on a high plateau, and is a very picturesque town, irregularly built, with steep and narrow streets and bold towers. It was a strong fortress under the Moors, but was taken in 1310 by Alfonso XI. in person, whence it obtained the name *Real*. The neighbourhood produces grain and fruits of the finest quality, and there is some trade in wine and wool. Pop. (1878) 15,901.

Alcalde, a corruption of the Arabic *al-qadi*, 'the judge.' It is still used in Spain as the general title for the elected president of the council of the commune, who exercises both judicial and magisterial offices. See CADI.

Alcamo, a quaint old town of Sicily, 52 miles SW. of Palermo by rail. Originally founded by the Saracens, it stood on the neighbouring Monte Bonifato (2713 feet), and long retained a Moslem population, who were driven out by the Emperor Frederick II. in 1233, when the new town was built at the foot of the hill. Pop. (1881) 37,697.

Alcaniz, a town of Aragon, Spain, in the province of Teruel, 63 miles SE. from Saragossa, on the Guadalope. It has a magnificent collegiate church. Pop. 7366.

Alcan'tara (Arabic, 'the bridge'), an old Spanish town in Estremadura, on a rocky height above the Tagus, near the Portuguese frontier. The bridge from which it takes its name was built under Trajan, 105 A.D. It consists of six arches; the whole length is 670, and the height 210 feet. It has twice been partially blown up in time of war, but the larger part is still intact. Pop. 3527.

THE ORDER OF ALCANTARA, one of the religious orders of Spanish knighthood, was founded in 1156 as a military fraternity for the defence of Estremadura against the Moors. In 1177, Pope Alexander III. raised it to the rank of a religious order of knighthood; and the grand-mastership of the order was by Pope Alexander VI. united to the Spanish crown in 1494. The order came to be richly endowed. The knights, who follow the rule of St. Benedict, take the usual vows of obedience and poverty, a special vow also binding them to defend the immaculate conception of the Virgin. In the present century the order has been several times suppressed, and as often restored. Thus it was suppressed in 1872, and restored again in 1874.

Alcantara, a seaport town of Brazil, in the province of Maranhão, on the Bay of St. Marcos. Pop. 10,000.

Alcaraz, a town of La Mancha, Spain, 36 miles WSW. of Albacete. A ruined castle crowns the summit of the hill; and there are also the remains of a fine Roman aqueduct. Pop. 4392.

Alcaude'te (ancient *Uditumum*), a town of Spain, 22 miles SW. of Jaen. Pop. of commune, 8500.

Alcazar de San Juan (ancient *Alee*), a town of Spain, in the province of Ciudad Real, 92 miles SSE. of Madrid by rail. Pop. 8721.

Alcazar-kebir, a city of Morocco, about 80 miles NW. of Fez, with considerable trade. In a battle here in 1578, Sebastian, king of Portugal, was defeated and slain by the Moors. Pop. nearly 9000, many Jews.

Alce'do. See KINGFISHER.

Alcestis, the wife of Admetus, king of Phæria in Thessaly. The god Apollo tended her husband's flocks when exiled from heaven for having slain the Cyclopes, and out of gratitude for his kindly treatment, prevailed upon the Fates to grant Admetus deliverance from death, if his father, mother, or wife should die in his stead. When the fatal hour arrived, Alcestis alone was found ready to give up her life for his. She was brought back to her husband from the lower world by Hercules. Alcestis is the subject of a noble tragedy by Euripides, which Browning has translated, and she appears as Chaucer's highest ideal of womanhood in the Prologue to his *Legend of Good Women*. The allusion to her story in one of the finest of Milton's sonnets will be remembered.

Alchemilla. See LADY'S MANTLE.

Alchemy is to modern chemistry what astrology is to astronomy, or legend to history. In the eye of the astrologer, a knowledge of the stars was valuable only as a means of foretelling, or even of influencing, future events. In like manner, the genuine alchemist toiled with his crucibles and alembics, calcining, subliming, distilling, not with a view to discover the chemical properties of substances, as we understand them, but with two grand objects, as illusory as those of the astrologer—to discover, namely, (1) the secret of transmuting the baser metals into gold and silver, and (2) the means of indefinitely prolonging human life.

The word is derived from the Arabic *al-kīmīā*, compounded of the Arabic article and a Greek word *chēmīā*, used in Ptolemy's *Geography* against Egyptian works treating of the *chēmīā* (transmutation) of gold and silver. The Greek word is now most usually explained to mean 'the Egyptian art,' and derived from the Egyptian name for Egypt, *Khmi*; but it was ultimately confounded with the true Greek *chēmīā*, pouring, infusion. The latter form, which was possibly, however, the real original of *chēmīā*, justifies the Renaissance spellings, *alchymy* and *chymistry*.

Tradition points to Egypt as the birthplace of the science. Hermes Trismegistus is represented as the father of it; but it should be remembered that the speculations of some of the early Greek philosophers, as of Empedocles, who first named the four elements, pointed in the direction of a rudimentary chemical theory. Zosimus the Theban discovered in sulphuric acid a solvent of the metals, and liberated oxygen from the red oxide of mercury. The students of the 'sacred art' at Alexandria believed in the transmutation of the four elements. The Roman emperor Caligula is said to have instituted experiments for producing gold out of orpiment (sulphuret of arsenic); and in the time of Diocletian, the passion for this pursuit, conjoined with magical arts, had become so prevalent in the empire, that that emperor is said to have ordered all Egyptian works treating of the chemistry of gold and silver to be burnt. For at that time multitudes of books on this art were appearing, written by Alexandrine monks and by hermits, but bearing famous names of antiquity, such as Democritus, Pythagoras, and Hermes.

At a later period, the Arabs, who had enthusiastically adopted Aristotle from the Greeks, appropriated the astrology and alchemy of the Persians and the Jews of Mesopotamia and Arabia; and it is to them that European alchemy is directly traceable. The school of polypharmacy, as it has been called, flourished in Arabia during the califates of the Abbasides. The earliest work of this school now known is the *Summa Perfectionis*, or 'Summit of Perfection,' composed by Gebir (q.v.) in the 8th century; it is consequently the oldest book on chemistry proper in the world. It contains so much of what sounds very much like jargon in our ears, that Dr. Johnson (erroneously) ascribed the origin of the word 'gibberish' to the name of the compiler. Yet when viewed in its true light, it is a wonderful performance. It is a kind of text-book, or collection of all that was then known and believed. It appears that these Arabian polypharmacists had long been engaged in calcining and boiling, dissolving and precipitating, subliming and coagulating chemical substances. They worked with gold and mercury, arsenic and sulphur, salts and acids; and had, in short, become familiar with a large range of what are now called chemicals. Gebir discovered corrosive sublimate, the process of cupellation of gold and silver, and distillation. He taught that there are three elemental chemicals—mercury, sulphur, and arsenic. These substances, especially the first two, seem to have fascinated the thoughts of the alchemists by their potent and penetrating qualities. They saw mercury dissolve gold, the most incorruptible of matters, as water dissolves sugar; and a stick of sulphur presented to hot iron penetrates it like a spirit, and makes it run down in a shower of solid drops, a new and remarkable substance, possessed of properties belonging neither to iron nor to sulphur. The Arabians held that the metals are compound bodies, made up of mercury and sulphur in different proportions. With these very excusable errors in theory, they were genuine practical chemists. They toiled away at the art of making 'many medicines' (polypharmacy) out of the various mixtures and reactions of such chemicals as they knew. They had their pestles and mortars, their crucibles and furnaces, their alembics and aludels, their vessels for infusion, for decoction, for colubation, sublimation, fixation, lixiviation, filtration, coagulation, &c. Their scientific creed was transmutation, and their methods were mostly blind gropings; and yet, in this way, they found out many a new body, and invented many a useful process. To the Arab alchemists we owe the terms alcohol, alkali, borax, elixir.

From the Arabs, alchemy found its way through

Spain into Europe generally, and speedily became entangled with the fantastic subtleties of the scholastic philosophy. In the middle ages it was chiefly the monks that occupied themselves with alchemy. Pope John XXII. took great delight in it, but denounced the searchers for gold 'who promise more than they can perform,' and the art was afterwards forbidden by his successor. The earliest authentic works on European alchemy now extant are those of Roger Bacon (1214-94) and Albertus Magnus (1193-1280). Roger Bacon (q.v.), who was acquainted with gunpowder, condemns magic, necromancy, charms, and all such things, but believes in the convertibility of the inferior metals into gold. Still, he does not profess to have ever effected the conversion, an idea which took firm possession of the imagination and, latterly, of the avarice of the middle ages. Their conception was that gold was the perfect metal, and that all other metals were so many removes or deflections from gold, in consequence of arrestment, corruption, or other accidents. Now, though gold, being simply perfect, could not, if mixed with the imperfect, perfect the latter, but would rather share its imperfections; yet, were a substance found many times more perfect than gold, it might well perfect the imperfect. Such a substance would be composed of purest mercury and sulphur, commingled into a solid mass, and matured by wisdom and artificial fire into possibly a thousand thousand times the perfection of the simple body. This was the philosopher's stone which so many devotees of alchemy in the middle ages toiled in vain to fabricate. Roger Bacon followed Gebir in regarding potable gold—that is, gold dissolved in nitro-hydrochloric acid or *aqua regia*—as the elixir of life. Urging it on the attention of Pope Nicholas IV., he informs his Holiness of an old man who found some yellow liquor (the solution of gold is yellow) in a golden phial, when plunging one day in Sicily. Supposing it to be dew, he drank it off. He was thereupon transformed into a hale, robust, and highly accomplished youth.—Albertus Magnus (q.v.) had a great mastery of the practical chemistry of his times; he was acquainted with alum, caustic alkali, and the purification of the royal metals by means of lead. In addition to the sulphur and mercury theory of the metals, drawn from Gebir, he regarded the element water as still nearer the soul of nature than either of these bodies. He is the first to speak of the affinity of bodies, a term he uses in reference to the action of sulphur on metals.—Thomas Aquinas (q.v.) also wrote on alchemy, and was the first to employ the word *Amalgam* (q.v.). Raymond Lully (q.v.) is another great name in the annals of alchemy. He was the first to introduce the use of chemical symbols, his system consisting of a scheme of arbitrary hieroglyphics. He made much of the spirit of wine (the art of distilling spirits would seem to have been then recent), imposing on it the name of *aqua vitae ardens*. In his enthusiasm, he pronounced it the very elixir of life.—Basil Valentine (q.v.) introduced antimony into medical use. He, along with some previous alchemists, regarded salt, sulphur, and mercury as the three bodies contained in the metals. He inferred that the philosopher's stone must be the same sort of combination—a compound, namely, of salt, sulphur, and mercury; so pure, that its projection on the baser metals should be able to work them up into greater and greater purity, bringing them at last to the state of silver and gold. His practical knowledge was great; he knew how to precipitate iron from solution by potash, and was acquainted with many similar processes, so that he is ranked as the founder of analytical chemistry.

But more famous than all was Paracelsus (q.v.),

in whom alchemy proper may be said to have culminated. He held, with Basil Valentine, that the elements of compound bodies were salt, sulphur, and mercury—representing respectively earth, air, and water, fire being already regarded as an imponderable—but these substances were in his system purely representative. All kinds of matter were reducible under one or other of these typical forms; everything was either a salt, a sulphur, or a mercury, or, like the metals, it was a 'mixt' or compound. There was one element, however, common to the four; a fifth essence or 'quintessence' of creation; an unknown and only true element, of which the four generic principles were nothing but derivative forms or embodiments: in other words, he inculcated the dogma, that there is only one real elementary matter—nobody knows what. This one prime element of things he appears to have considered to be the universal solvent of which the alchemists were in quest, and to express which he introduced the term *alcalhest*. He seems to have had the notion, that if this quintessence or fifth element could be got at, it would prove to be at once the philosopher's stone, the universal medicine, and the irresistible solvent. An often-quoted saying of his is '*Vita ignis, corpus lignum*' (Life is the fire, the body the fuel).

After Paracelsus, the alchemists of Europe became divided into two classes. The one class was composed of men of diligence and sense, who devoted themselves to the discovery of new compounds and reactions—practical workers and observers of facts, and the legitimate ancestors of the positive chemists of the era of Lavoisier. The other class took up the visionary, fantastical side of the older alchemy, and carried it to a degree of extravagance before unknown. Instead of mystical trash into books, and fathered them on Hermes, Aristotle, Albertus Magnus, Paracelsus, and other really great men. Their language is a farrago of mystical metaphors, full of 'red bridegrooms' and 'lily brides,' 'green dragons,' 'ruby lions,' 'royal baths,' 'waters of life.' The seven metals correspond with the seven planets, the seven cosmical angels, and the seven openings of the head—the eyes, the ears, the nostrils, and the mouth. Silver was Diana, gold was Apollo, iron was Mars, tin was Jupiter, lead was Saturn, and so forth. They talk for ever of the powder of attraction, which drew all men and women after the possessor; of the alkalhest or universal solvent, and the grand elixir, which was to confer immortal youth upon the student who should approve himself fit to kiss and quaff the golden draught. There was the great mystery, the mother of the elements, the grandmother of the stars. There was the *philosopher's stone*, and there was the *philosophical stone*. The philosophical stone was younger than the elements, yet at her virgin touch the grossest calx (ore) among them all would blush before her into perfect gold. The philosopher's stone, on the other hand, was the first-born of nature, and older than the king of metals. Those who had attained full insight into the arena of the science were styled Wise; those who were only striving after the light were Philosophers; while the ordinary practisers of the art were called Adepts. It was these visionaries that formed themselves into Rosicrucian Societies and other secret associations. It was also in connection with this mock-alchemy, mixed up with astrology and magic, that quackery and imposture so abounded, as is depicted by Scott in the character of Dousterswivel in the *Antiquary*. Designing knaves would, for instance, make up large nails, half of iron and half of gold, and lacker them, so that they appeared common nails; and when their credulous and avaricious dupes saw them extract

from what seemed plain iron an ingot of gold, they were ready to advance any sum that the knaves pretended to be necessary for pursuing the process on a large scale. It is from this degenerate and effete school that the prevailing notion of alchemy is derived—a notion which is unjust to the really meritorious alchemists who paved the way for genuine chemistry. In 1782 Dr Price of Guildford exhibited to George III. some specimens of gold he affirmed he had made from a red and white powder. Being called upon, as a member of the Royal Society, to repeat his experiments in the presence of two witnesses, after much equivocation he took poison and died (1783). It should be remembered that Robert Boyle believed in the possibility of the alchemistic transmutations; Sir Isaac Newton not merely studied with care the works of the alchemists, but in his earlier years actually laboured in the search for the philosopher's stone.

It is interesting to observe that the leading tenet in the alchemists' creed—namely, the doctrine of the transmutability of other metals into gold and silver—a doctrine which it was at one time thought that modern chemistry had utterly exploded, and which was rejected as an impossibility by Sir Humphry Davy—receives not a little countenance from a variety of facts now coming to light, especially in connection with *Alotropia* (q.v.). See Kopp's *Die Alchemie in älterer und neuerer Zeit*, and his *Geschichte der Chemie*; Hofer's *Histoire de la Chimie*; and G. Rodwell's *Birth of Chemistry* (1874).

Alcibiades, son of Clinias and Deinomache, was born at Athens about 450 B.C. He lost his father in the battle of Coronea (447), so was brought up in the house of his kinsman Pericles. In youth he gave evidence of his future greatness, excelling in both mental and bodily exercises. His goodly person, his distinguished parentage, and the high position of Pericles, procured him a multitude of friends and admirers. Socrates was one of the former, and gained considerable influence over him, but was unable to restrain his love of luxury and dissipation, which found ample means of gratification in the wealth that accrued to him by his union with Hipparete. His public displays, especially at the Olympic games, were costly beyond belief. He first bore arms in the expedition against Potidea (432 B.C.), where his life was saved by Socrates—a debt which eight years later he repaid at Delium, by saving, in his turn, the life of the philosopher. He seems to have taken no part in political matters till after the death of the demagogue Cleon, when Alcibiades brought about a fifty years' treaty of peace between Athens and Lacedæmon. Alcibiades, jealous of the esteem in which Cleon was held, persuaded the Athenians to ally themselves with the people of Argos, Elis, and Mantinea (420), and did all in his power to stir up afresh their ancient enmity to Sparta. It was at his suggestion that, in 415, they engaged in the Sicilian expedition, to the command of which he was elected, along with Nicias and Lamachus. But while preparations were making, one night all the statues of Hermes in Athens were mutilated. Alcibiades' enemies threw on him the blame of this sacrilege, but postponed the impeachment till he had set sail, when they stirred up the people against him to such a degree, that he was recalled, in order to stand his trial. On the voyage home, he landed in Italy, and thence crossed to Lacedæmon, where, by conforming to the strict Spartan manners, he soon became a favourite. He induced the Lacedæmonians to send assistance to Syracuse, to form an alliance with Persia, and to support the people of Chios in their effort to throw off the Athenian yoke. He went thither himself, and raised all Ionia in revolt. But

Agis and other leading Spartans, jealous of Alcibiades' success, ordered their generals in Asia to have him assassinated. Discovering the plot, he fled to Tissaphernes, a Persian satrap, who had orders to act in concert with the Spartans. He now resumed his old manners, adopted the luxurious habits of Asia, and made himself indispensable to Tissaphernes, representing to him that it was contrary to Persia's interests entirely to disable the Athenians. He then sent word to the Athenian commanders at Samos that he would procure for them the friendship of the satrap if they would establish an oligarchy at Athens. The offer was accepted, and the supreme power vested in a council of Four Hundred. When it appeared, however, that this council had no intention of recalling Alcibiades, the army at Samos chose him for a general, desiring him to lead them to Athens. But Alcibiades did not wish to return to his native country till he had rendered it some service; and during the next four years he defeated the Lacedæmonians at Cynossema, Abydos, and Cyzicus; recovered Chæcedon and Byzantium, and restored to the Athenians the dominion of the sea. He then returned home (407), on a formal invitation, and was received with general enthusiasm. His triumph, however, was brief. He was sent back to Asia with a hundred ships; but his own ill-success against Andros, and the defeat of his lieutenant at Notium, enabled his enemies to get him superseded (406). He went into exile in the Thracian Chersonesus, and two years later crossed over to Phrygia, with the intention of repairing to the court of Artaxerxes. Historians differ as to why, and by whom the deed was done; but one night, in 404, his house was fired by a band of armed men; and, rushing out sword in hand, he fell pierced with a shower of arrows. Nature had gifted him with winning eloquence (though he stuttered in his speech, and could not articulate the letter *ρ*), and his in a rare degree was the power to fascinate and govern men. In all his actions, he allowed himself to be guided by circumstances, because he had no fixed principles of conduct. But he possessed the boldness that comes from conscious superiority; he shrank from no difficulty, because he was never doubtful of the means for attaining an end.

Alciphron, a Greek writer of epistles noted for elegance. He lived about 180 A.D.

Alcira (ancient *Sabaticula*), a town of Spain, in the province of Valencia, 22 miles SSW. of Valencia by rail, on an island in the river Xucar. Silk, rice, and oranges form the chief articles of commerce. Pop. 16,146.

Alcmæon, a son of Amphiaraus and Eriphyle, was one of the heroes who took part in the successful expedition of the *Epigoni* against Thebes. He was charged by his father to put his mother to death, in revenge for her having urged her husband to take part in an expedition in which his foresight showed him he should perish. She had been gained over to urge this fatal course by a gift from Polynices of the fatal necklace of Harmonia. The matricide brought upon Alcmæon madness and the horror of being haunted by the Furies, but at Psophis he was purified by Phegeus, whose daughter he married, giving her the fatal present. But the land became barren in consequence of his presence, and he fled to the mouth of the river Achelous, the god of which gave him his daughter Callirrhoe in marriage. His new wife longed for the fatal necklace, and sent her husband to Psophis to procure it, under pretence of dedicating it at Delphi; but Phegeus, learning for whom it was really intended, caused his sons to murder the ill-fated Alcmæon.

Aleman, one of the earliest Greek lyric poets, was born about the middle of the 7th century B.C. at Sardis, in Lydia, but lived, first as a slave, and afterwards as a freedman, in Sparta. The first to write erotic poetry, he composed in the Doric dialect *Parthenia*, or songs sung by choruses of virgins, bridal-hymns, and verses in praise of love and wine. Of his scanty fragments, which are given in Bergk's *Poete Lyrici Græci* (4th ed. 1878), the most important is a *Parthenion*, discovered on an Egyptian papyrus at Paris in 1855.

Alcock, SIR RUTHERFORD, K.C.B., was born in 1809 in London, studied medicine there at King's College, and saw three years' service on the medical staff of the British auxiliaries in Portugal and Spain (1833-6). Sent out in 1844 as a British consul to China, he was in 1858 made consul-general in Japan, and next year received the rank of minister-plenipotentiary. This dangerous post he filled until 1865, from which year till 1871 he was envoy to the Chinese government. He was made a C.B. in 1860, a K.C.B. in 1862, a D.C.L. of Oxford in 1863, and President of the Royal Geographical Society in 1876. Among his works are *Medical Notes on the British Legion of Spain* (1838); *The Capital of the Tycoon* (1863); and *Art in Japan* (1878).

Alcohol (Arab. *al-koh'l*, originally designating a collyrium, a very fine powder of antimony for staining the eyelids; afterwards 'essence,' 'spirits'). Ordinary or *ethyl* alcohol is a limpid, colourless liquid, of a hot pungent taste, and having a slight but agreeable smell. It is the characteristic ingredient of fermented drinks, gives them their intoxicating quality, and is obtained from them by distillation. If we look at the extraordinary consumption of these liquors for various purposes, it is seen to be one of the most important substances produced by art.

Alcohol occurs in nature in several growing plants, and must therefore be regarded as an occasional constituent of plant-juices which have not undergone fermentation. It has been found in the fruit and pedicels of *Heracleum nigellastrum*, the fruit of the parsnip and the antipode fruit of *Antirrhinum foliolium*. For practical purposes, there is, however, only one source of alcohol, namely, the fermentation of sugar or other saccharine matter. Sugar is the produce of the vegetable world. Some plants contain free sugar, and still more contain starch, which can be converted into sugar. The best vegetable substances, then, for yielding alcohol are those that contain the greatest abundance of sugar or of starch. See DIASTASE, FERMENTATION, and DISTILLATION.

Owing to the attraction of alcohol for water, it is impossible to procure pure alcohol by distillation alone. Common spirits, such as brandy, whisky, &c. contain 50 or 52 per cent. of alcohol; in other words, they are about half alcohol, half water. *Proof-spirit*, which is the standard by means of which all mixtures of alcohol and water are judged, contains 57.27 per cent. by volume, and 49.50 per cent. by weight of alcohol. The specific gravity of proof-spirit is .9186; and when a spirit is called *above proof*, it denotes that it contains an excess of alcohol; thus, *spirit of wine*, or rectified spirit, with specific gravity .838, is 54 to 58 overproof, and requires 54 to 58 per cent. of water to be added to it to bring the strength down to that of proof-spirit; whilst the term *under proof* has reference to a less strong spirit than the standard (see HYDROMETER). The most primitive method of learning the strength of alcohol was to drench gunpowder with it, set fire to the spirit, and if it inflamed the gunpowder as it died out, then the alcohol stood the test or proof, and

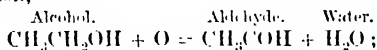
was called proof-spirit. The highest concentration possible by distillation gives 90 per cent. of alcohol, still leaving 10 per cent. of water. In order to remove this, fused chloride of calcium, quicklime, or fused carbonate of potash, is added to the alcoholic liquid, the whole allowed to stand for twelve hours, and then the spirit may be distilled off practically free from water. Spirit of wine may also be deprived of its remaining water by suspending it in a bladder in a warm place; the bladder allows much of the water to pass through and evaporate, but little of the alcohol. The latter method is called Soemmering's process, and depends on the different degrees of rapidity with which the bladder admits of water and alcohol passing through it. Thus, introduce into one bladder eight ounces of water, and into a second eight ounces of alcohol, and allow both bladders to be similarly exposed on a sandbath till all the water has evaporated through the pores of the membrane, which will be accomplished in about four days; and it will then be observed that whilst eight ounces of water have made their exit from the bladder, only one ounce of alcohol has thus evaporated, and seven ounces still remain in the bladder. This experiment explains why smugglers, a few generations ago, could supply a whisky which was stronger, and hence esteemed preferable, as they carried the whisky in bladders around their persons, and the water escaping therefrom in much greater proportion than the alcohol, a stronger spirit was left.

Absolute or anhydrous alcohol has a specific gravity of .793 at the temperature of 60° F. (15.5° C.). It boils at 173° F. (78.4° C.), and has not been frozen by any cold hitherto produced. Reduced to a temperature of -130° F. (-72° C.), alcohol becomes of an oily and greasy consistence; at -146° F. (-81° C.), it assumes the aspect of melted wax; and at -166° F. (-92° C.), it gets still thicker, but does not congeal at the lowest attainable temperature. This property of non-freezing at any degree of cold to which the earth is subjected, has led to the employment of alcohol coloured red by cochineal, in the thermometers sent out to the arctic regions. It is highly inflammable, its combustion yielding only carbonic acid and water. It has a very strong attraction for water, and when mixed with it, much heat is evolved and a contraction in volume takes place. Thus 2 gallons of alcohol and 1 of water measure less than 3 gallons. Its poisonous action when taken internally in large quantity has been referred to this same property, the idea being that it removes water from the tissues, and thus destroys them. The formula of alcohol is C₂H₅OH. In 100 pounds, therefore, of alcohol, about 53 are carbon, 13 hydrogen, and 34 oxygen. Besides the alcohol consumed in wine, beer, and spirits, it is much employed in pharmacy and in the arts. It is a powerful solvent for resins and oil; and hence is employed in the preparation of varnishes. In Germany, a cheap spirit made from potatoes is much used for cooking on a small scale.

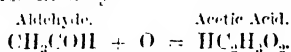
During recent years, our knowledge of the properties of ordinary alcohol, and of the general class of bodies to which the term ALCOHOLS is applied, in consequence of their resemblance, in certain chemical reactions, to ordinary alcohol, has been very much enlarged. The alcohols are all compounds of carbon, hydrogen, and oxygen, and are perfectly neutral to test papers. Many of them are produced along with ordinary alcohol in the process of fermentation, and alter the flavour of the resulting beverage; such are amylie (fusel oil) and butylic alcohol. They are chiefly characterised by yielding, on treatment with acids, neutral bodies called ethers, the formation of water being a part of the

reaction. According to the theory of Chemical Types (q.v.), the alcohols are divided into monatomic (comprising the important series of methyl, ethyl, propyl, and other alcohols, which are referred to further below) and polyatomic. According to their behaviour on oxidation, they are further divided into primary, secondary, and tertiary.

In a nearly anhydrous state, alcohol has little tendency to oxidation, but when freely diluted, and exposed to the air, it rapidly becomes oxidised into acetic acid. This conversion is, however, not a direct one, an intermediate compound, termed Aldehyde (q.v.), being first formed, which is rapidly oxidised into acetic acid. The oxidation of alcohol into aldehyde is represented by the equation,



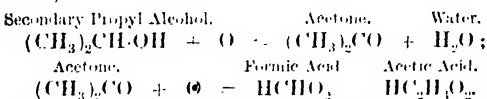
and the further oxidation of aldehyde into acetic acid is represented by



In the first reaction, alcohol loses two atoms of hydrogen, water being formed; in the second, aldehyde takes up one atom of oxygen.

Every alcohol which like ordinary alcohol yields on oxidation an aldehyde, and on further oxidation an acid having the same number of carbon atoms as the alcohol itself, is termed a primary alcohol. To take another example, primary propyl alcohol, $\text{C}_3\text{H}_7\text{OH}$, is oxidised first into propyl aldehyde, $\text{C}_3\text{H}_5\text{OH}$, and then into propionic acid, $\text{HC}_3\text{H}_5\text{O}_2$. Primary alcohols are subdivided into normal and iso-alcohols, but it would lead us too far to explain the meaning of this distinction.

Secondary alcohols on oxidation lose two atoms of hydrogen, and are converted into bodies known as acetones or ketones, which differ from aldehydes inasmuch as they are not converted on oxidation into acids having the same number of carbon atoms, but are split up into acids having a smaller number of carbon atoms. Thus secondary propyl alcohol is oxidised into acetone, and on further oxidation, acetone splits up into formic and acetic acids,



It will be observed that propyl alcohol and secondary propyl alcohol, propyl aldehyde and acetone, are respectively isomeric (see ISOMERISM).

Tertiary alcohols on oxidation give neither aldehydes nor ketones, but split up into acids having a smaller number of carbon atoms. Thus tertiary butyl alcohol, $(\text{CH}_3)_3\text{COH}$, which is isomeric with primary and with secondary butyl alcohol, splits up on oxidation into acetic and formic acids. Only a comparatively small number of secondary and tertiary alcohols are at present known, and their properties and reactions have not been so thoroughly studied as those of the much more numerous class of primary alcohols. Theoretical considerations, however, lead to the belief that their number will be largely increased.

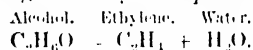
Ordinary or ethyl alcohol is *monatomic*—i.e. it may be regarded as being derived from the type HOH , by the substitution of its radical ethyl, C_2H_5 , for one atom of hydrogen. This view is expressed by the formula $\text{C}_2\text{H}_5\text{OH}$.

The *monatomic alcohols* are more abundant than all the *polyatomic alcohols* put together. There are several series of them, of which the most important are alcohols whose radical is of the formula $\text{C}_{2n} + \text{H}_{2n+1}$ (as methyl, CH_3 ; ethyl, C_2H_5 ;

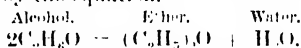
propyl, C_3H_7 , &c.), and which are represented by the formula $(\text{C}_n\text{H}_{2n+1})\text{HO}$. They are intimately related to the fatty acids, whose general formula is $\text{C}_n\text{H}_{2n}\text{O}_2$, and which may be formed from the alcohols by oxidation, H_2 being replaced by O. The three highest alcohols of this set, cetyllic, ceryllic, and melissylic alcohols, have the formulae $\text{C}_{16}\text{H}_{34}\text{O}$, $\text{C}_{27}\text{H}_{56}\text{O}$, and $\text{C}_{30}\text{H}_{62}\text{O}$, and are solid, waxy, or fatty matters.

Of the *polyatomic alcohols*, *diatomic* alcohols belong to the secondary water type, $(\text{H}_2\text{O})_2$ or $\text{H}_2\text{O}_2\text{H}_2$. Thus the most important diatomic alcohol, glycol, $\text{C}_2\text{H}_6\text{O}_2$, is represented, according to the theory of types, by the formula $(\text{C}_2\text{H}_4)''\text{O}_2\text{H}_2$, its radical, C_2H_4 , being marked with two dashes to indicate that it replaces two atoms of hydrogen. So also there are *tri*, *tetra*, and *hecatonic* alcohols corresponding to 3, 4, and 6 molecules of water, examples of which are glycerine, $(\text{C}_3\text{H}_5)''' \text{O}_3\text{H}_3$; erythrite (obtained from litmus), $(\text{C}_4\text{H}_6)'''' \text{O}_4\text{H}_4$; and mannite (from manna), $(\text{C}_6\text{H}_8)''''' \text{O}_6\text{H}_6$.

Dry chlorine and absolute alcohol react on each other in a singular manner—the final product being a solid compound of alcohol with a very remarkable colourless oily fluid, called chloral, having a peculiar penetrating and irritating odour, and having the formula $\text{C}_2\text{H}_5\text{ClO}$. By treatment with strong sulphuric acid, this chloral is set free, and may be changed into chloroform by warming with an alkali. Dilute alcohol, distilled with chloride of lime (bleaching powder), yields chloroform; and this is the most economical process for obtaining this invaluable compound. Heated with an excess of sulphuric acid, alcohol loses all its oxygen in the form of water, and is converted into ethylene, the result being shown by the equation.



A less complete dehydration, under the action of sulphuric acid, converts alcohol into ether. The process is a complicated one, but the final result is expressed by the equation.



The best tests for discovering the presence of alcohol are—(1) Its hot pungent taste, its odour, and its great volatility. (2) Absorbed in asbestos, it burns with a pale blue flame, which deposits no carbon on white porcelain; and when burned in the mouth of an inverted test-tube, containing a few drops of solution of baryta, it produces a well-marked deposit of carbonate of baryta—carbonic acid and water being the products of its combustion. (3) When boiled with sulphuric acid, and a few drops of a saturated solution of bichromate of potash, it reduces this salt to green sulphate of chromium. The chromium test, originally discovered by Dr Thomson in 1816, is that on which the French physiologists Lallemand, Perrin, and Duroy relied in their investigations regarding the presence of alcohol in the blood, urine, expired air, &c. (4) The least trace of alcohol in an aqueous solution can be detected by adding a little chloride of benzoyl, and then a little caustic potash; benzoate of ethyl, a liquid having a very characteristic aromatic odour, is at once formed, and enables one thousandth part of alcohol in a teaspoonful of water to be detected.

Alcohol is of a double use to the chemist, inasmuch as it furnishes a cleanly and valuable fuel when used in the spirit-lamp, and possesses remarkable solvent powers without in general exerting chemical action on the dissolved substances. It dissolves many of the gases more freely than water, as, for example, nitrous oxide, carbonic acid, phosphuretted hydrogen, cyanogen, and the hydrocarbons, as, for instance, ethylene. Amongst the

mineral substances which it dissolves may be mentioned iodine, bromine, boracic acid, the hydrates of potash and soda, the chlorides of calcium, strontium, magnesium, zinc, platinum, and gold, the perchloride of iron, corrosive sublimate, the nitrates of lime, magnesia, &c.; whilst amongst organic matters, it dissolves many organic acids, bases, and neutral bodies, the resins, the soaps, and the fats. The latter dissolve more freely in ether than in alcohol. The alcoholic solutions of substances used in medicine are called *Essences, spirits, and tinctures*. See BRANDY, WHISKY, FUSSEL OIL, AMYL.

ACTIONS AND USES OF ALCOHOL.—The only alcohols which require to be taken into consideration are those belonging to the methyl, ethyl, propyl, butyl, and amyl series. It is of interest to observe that these alcohols increase in activity in direct proportion to their rise in atomic weight; amyl alcohol or potato spirit, for instance, is about five times as powerful as ethyl alcohol or spirit of wine. Ethyl alcohol alone is in general use, and it displays the most characteristic series of effects—to it, therefore, attention will here be entirely directed. When applied to the skin and allowed to evaporate, alcohol cools the surface of the body, and causes contraction of the local vessels, with diminution of the secretions. It may therefore be employed as a refrigerant and astringent, to lessen the surface temperature and check excessive perspiration. If, on the other hand, it is kept in contact with the skin without evaporation, it produces increased flow of blood in the part by penetrating through the cuticle, and it may be used in this way as a rubefacient when counter-irritation is desired. Upon the terminations of the nerves of sensation, it acts at first as a stimulant, and causes a feeling of heat and pain, but it afterwards has a depressing effect upon them and produces numbness. In this way it is of importance as an ingredient in lotions and liniments intended for application to painful parts. When brought in contact with mucous membranes, alcohol produces effects similar in kind to those mentioned in connection with the skin, but, on account of the greater sensitiveness of the former, the effects are more marked. As alcohol coagulates albumen, it forms a film of white colour upon the mucous membranes by acting on the albuminous elements of the secretions.

When taken into the mouth, alcohol causes an increased secretion of saliva, by acting reflexly through the nerves regulating the salivary glands, and at the same time, in a similar manner, it induces a flow of the gastric juice through the nerves of the stomach. Reaching the stomach, it increases the gastric secretion, and causes dilatation of the vessels, with flushing of the surface, attended by a sense of warmth and a feeling of appetite. Taken before food, it is thus of considerable benefit in cases of impaired digestion. It also increases the muscular contractions of the stomach and intestines, and may be used for the purpose of expelling or preventing flatulence, although it is not to be recommended for this symptom. If taken in excess or in too concentrated form, alcohol causes catarrh of the stomach and bowels. Upon the digestive juices in moderately dilute solutions pure alcohol has little or no effect, and causes no retarding influence on the digestive processes. It is otherwise, however, with wines. The volatile substances which they contain exercise a powerfully inhibitory action on these processes. If it be taken in great excess, alcohol is entirely absorbed in the stomach, none passing into the intestines. It passes into the circulation for the most part unchanged, only a very small proportion being absorbed as acetic and carbonic acids. Entering the blood, it seems to unite with the hæmoglobin

of the coloured corpuscles, forming a compound which yields up oxygen to the tissues much less readily than under ordinary circumstances. In this way the oxidation of the tissues is retarded, and there is less waste, while the alcohol itself is oxidised in the tissues, acting as a food, and producing carbonic acid and water. Circulating in the blood, it gives rise to specific effects on the nervous system, and through it upon the different organs of the body. On nervous structures it produces a brief, transient stimulation, followed by depression, of their functions. Its first effect is shown by dilatation of the vessels throughout the body, with reduction of arterial pressure, and acceleration of the action of the heart—these being the consequence of depression of the vaso-motor nerves regulating the vessels, which has supervened upon the brief excitement of these nerves. The surface of the body becomes flushed and moist from the dilatation of the vessels and consequent increased secretion of the sweat glands. At the same time, from the loss of heat by radiation from the surface, the body-temperature falls. Alcohol is therefore worse than useless as a means of sustaining heat in cold climates. The respiration is accelerated by small quantities, and retarded by larger amounts, and the organs throughout the body generally are congested and stimulated to activity by alcohol, more especially the kidneys.

Upon the central nervous system, alcohol, after the brief excitement above mentioned, acts by causing a progressive impairment of the centres, from the higher or intellectual to the lower or organic; and the effects are directly proportional to the quantities taken. After the use of a quantity well within the limits of moderation, there is increased activity of these nervous centres, which shows itself by greater clearness of reasoning, strength of volition, vividness of imagination, depth of emotion, acuteness of sensibility, and force of muscular movement. As a consequence, thoughts flow swiftly, the speech becomes fluent, and is often accompanied by lively gesticulations. If the amount which has been taken, however, is beyond the limits of moderation, there is some disturbance of the various functions. The intellectual centres suffer in the first place, and while the imaginative and emotional, as well as sensory and motor functions are still stimulated, the reasoning faculties and the will become obscured and impaired. The imagination and emotions next become perverted, and, lastly, sensibility and motility are depressed. The muscles become irregular in their movements so that the gait is staggering, or they may be paralysed, when the erect posture is an impossibility. If the quantity taken is very great, it may cause paralysis of the vital centres in the medulla oblongata, in which case death ensues from failure of respiration or circulation, or of both. Taken in moderate quantity, alcohol is, for the most part, oxidised and excreted as carbonic acid and water, only about a fifth being given off by the lungs, kidneys, and skin in an unchanged form. The two most important uses of alcohol are as a stimulant and as a food. As a stimulant, it may be employed in all diseases threatening to end in death from failure of the heart, but it is on no account to be given in cases of simple nervous depression. As a food, alcohol plays an important part in the treatment of all wasting diseases, but it finds its most useful place in the treatment of fevers. The opposing views held in regard to the employment of alcohol may be found in a series of articles on 'The Alcoholic Question' in the *Contemporary Review*, vols. for 1878 and 1879. See also Foon.

Alcoholism is the term employed to denote the symptoms of disease produced by alcoholic poisoning. It is usual to consider the subject

under two heads, according as the affection is acute or chronic. Acute alcoholism, which is generally caused by the rapid absorption of a large quantity of alcohol, commonly begins with the same train of symptoms—animation of manner, exaltation of spirits, and relaxation of judgment, which lead to want of mental control. The emotions are also affected, always being altered, and often perverted. The co-ordination of muscular movements is impaired, and they become irregular or ataxic in character. The mechanism of speech is, as a rule, the first to suffer, but other muscular efforts are also rendered imperfect, the erect posture even becoming impossible. Thus far, the initial manifestations are tolerably uniform, but the further development of the symptoms presents three different series of effects. In the ordinary course of the action of the drug, the individual suffers from headache, giddiness, disturbance of sight and hearing, and other troubles due to disorder of the central nervous system, which lead to heavy sleep or profound coma. Usually the individual may be roused from the sleep or coma, but when this is very deep it may be impossible to do so, and he lies completely paralysed, breathing stertorously. Sometimes the alcohol produces such a powerful effect upon the centres of respiration and circulation that death is caused by paralysis of one or other, or both. This condition of coma requires to be carefully distinguished from opium poisoning. In the former, the face is usually flushed and the pupils dilated, while in the latter the face is pale and the pupils contracted; but these appearances are not constant; and it need hardly be added that the odour of the breath is no criterion, inasmuch as the use of spirits is regarded as the panacea in all conditions of depression, and sympathising bystanders are prompt to administer them in every case, often with very hurtful effects. The second class of effects is entirely different from the foregoing. Instead of sinking into sopor or coma, the individual under the influence of the poison becomes more and more excited, bursts into wild mirth or passionate anger, engages in violent struggles with any one who attempts to soothe him, and may do grievous bodily harm to himself or others. This is the condition known as alcoholic mania, and it is the physical explanation of many fearful crimes. After a longer or shorter period of fierce excitement, it is in most cases succeeded by great depression, and sometimes during this condition there may be sudden death from failure of the respiration or circulation. In the third division, the stage of excitement culminates in a convulsive seizure somewhat resembling that seen in hystero-epilepsy. The convulsions, which are repeated at intervals, are very complicated in their character, and produce remarkable contortions of the body. These usually become less violent as they recur, and passing off, end in deep sleep; but here also death may occur from the action of the poison. It should be observed that acute alcoholism is more apt to occur in those who are of unsound mind and weak nervous system, and this applies especially to the two last-described forms of the affection. In the treatment of acute alcoholism, it is sometimes necessary to wash out the stomach in case any alcohol may be present, but from its rapid absorption this is rarely the case. In the profound coma the administration of stimulants, such as ammonia, may be called for, and sometimes artificial respiration may be the only means of saving life. In the manic and convulsive forms of the affection, chloral along with aconite of potassium must be used. After the immediate symptoms have passed away in all forms, the individual must be carefully fed, on

account of the disturbance of the digestive system which is caused by the overdose of alcohol, with nutrient enemata, along with remedies which will subdue the digestive irritation and stimulate the depression of the nervous system.

Chronic alcoholism is caused by the prolonged use of overdoses of various alcoholic drinks. The drug causes changes in every tissue of the body, but it more especially affects the nervous, respiratory, and circulatory systems, together with the liver and kidneys. There is always more or less catarrh of the digestive organs, shown by dyspepsia, heartburn, flatulence, nausea, vomiting especially in the morning—and usually diarrhoea. The liver, to which, in the first instance, all the alcohol absorbed is carried by the vessels, becomes enlarged from congestion in the early stages; and it afterwards shrinks, from the development of fibrous tissue by chronic irritation and the subsequent contraction of this new growth; it exercises pressure on the veins bringing back blood to the heart from the abdominal viscera—thus leading to congestion of the bowels, hemorrhoids, and hemorrhages. In some cases there is fatty degeneration of the liver, with or without the fibrous change. From changes in the organs of circulation, there is a tendency to palpitation, fainting, and breathlessness on exertion. These alterations are degenerations of the heart, which may be soft and flabby, or even fatty; fibrous changes in the walls of the arteries; and dilatation of the capillaries from paralysis of the vaso-motor nerves. This last condition gives the florid complexion and mottled appearance to chronic drinkers, and it renders them prone to all inflammations, which, as may be expected, are much more fatal to them than to temperate men. Connected with these changes in the circulation, there is usually some congestion of the kidneys; but it is erroneous to attribute Bright's Disease mainly to alcohol. The lungs are subject to chronic congestion and catarrh of the bronchial tubes and lung tissues. The muscular system suffers, the muscles becoming flabby and fatty. There is a great tendency to deposition of fat, from interference with digestion, and skin-diseases are frequently induced by the vaso-motor changes.

But of all the symptoms of chronic alcoholism those connected with the nervous system are the most characteristic. The moral sense is impaired, the will-power weakened, and the intellectual energies enfeebled, but there are in addition two characteristic results of the poisonous action of the drug upon the central nervous structures. These are *delirium tremens* and alcoholic insanity. The former consists in a delirium, varying from quiet wandering to wild mania, marked by hallucinations, usually of a revolting character, such as of creeping reptiles, with tremulousness of the muscles, attended by sleeplessness; the latter may assume many of the clinical aspects of insanity. After death, the morbid anatomy consists in congestion of the membranes of the brain, which are more adherent to the skull and brain than in health; there is usually opacity of the middle or arachnoid membrane, and an increase in the cerebro-spinal fluid. The brain and spinal cord show no definite alterations. The peripheral nervous system also suffers, and there may be pain and tenderness, or loss of sensibility, and tremor, spasm, or paralysis in various areas, according as the sensory or motor nerves are affected. The appearances after death are those of neuritis, or inflammation of the nerves supplying the affected regions. In the treatment of chronic alcoholism, the great point is to put a stop to the employment of alcohol in every form, and this usually requires careful moral discipline. The bodily and mental functions must be invigorated by all means, and an outdoor life is one

of the best methods of carrying this out. The different symptoms connected with the various systems must be met as they present themselves. In *delirium tremens* the patient must have sleep, which is best obtained by the use of bromide of potassium and chloral hydrate. Alcoholic insanity falls to be considered under INSANITY.

Alcoholometry is the process of estimating the percentage of absolute alcohol in a sample of spirits. See HYDROMETER.

Alcoran: See KORAN.

Alcott, LOUISA MAY, a popular American authoress, daughter of Amos Bronson Alcott, a noted educationist, born at Germantown, Pennsylvania, November 29, 1832, was for some years a teacher, began to write at an early age, and published her first book, *Flower Fables*, in 1855. Her life as a volunteer hospital nurse during the civil war furnished material for her *Hospital Sketches* (1865), and supplied a background for several of her tales. She had written for the *Atlantic Monthly*, and published several books before her first and greatest success, *Little Women* (1868), and a second part (1869), which was followed by *Little Men* (1871), with its sequel, *Jo's Boys* (1886). Amongst her numerous other works are *An Old-fashioned Girl* (1869); *Under the Lilacs* (1878); and *An Old-fashioned Thanksgiving* (1882). Few writers are more popular with children than Miss Alcott; she is a pleasant teacher, and her stories are valuable as giving insight into the more wholesome side of child-life and child-ways in America.

Alcove (Spanish *alcoba*, from the Arabic *al-qubbah*, 'the vault'), a recess or part of a chamber in which a bed of state or seats may be placed. It is shut off by a balustrade, or by draperies. The name is also applied to any arched recess or niche in the wall of an apartment, also to any nook or natural recess in a ledge or rock. The modern use of the word is chiefly poetical.

Alecoy, a manufacturing town of Spain, on the river Alecoy, 15 miles N. of the town of Alicante. It is 'built in a funnel of the hills, on a tongue of land hemmed in by two streams, with bridges and arched viaducts.' The houses hang picturesquely over the terraced gardens and ravines. The staple manufacture is paper, especially cigarette paper. Alecoy is also famous for its sugar-plums, and makes coarse woollen cloths. It has a consistory, town-hall, poor asylum, public granary, &c. In 1873 it was the scene of a rising of the Spanish International. Pop. (1878) 32,497.

Alendia, MAXUEL DE GODOY DUKE OF, a Spanish statesman, was born at Badajoz, 12th May 1767. A mere boy when he came to court, his handsome figure and agreeable manners soon gained him the favour of the queen and of the weak king, Charles IV. He was successively made Duke of Alendia (taking his title from a small town of that name in Majorca), generalissimo of the forces, and prime minister in 1792. He received the title of 'Prince of the Peace' for his share in the treaty with France, concluded at Basel in 1795. His power, which was at its height in 1807, from that time began to decline. The nobles hated him for his monopoly of political power, while the people ascribed to his ambitious prodigality all the poverty and misery that was the consequence of a long war. When the king abdicated in favour of his son in 1808, Alendia's life was only saved by the promise of a trial. This trial, however, never took place. Napoleon, who knew his influence over the mind of the Spanish king, had him liberated, and brought to Bayonne, where he instigated all measures taken by the ex-king and queen. After the death of Charles IV. he lived at Paris, and received a small

pension from Louis-Philippe. In 1847 his return to Spain was permitted, and his titles, together with great part of his wealth, restored. He died at Paris, 7th October 1851. His *Memoirs* were published in 8 vols. in 1836.

Alcuin, or ALBINUS, the most distinguished scholar of the 8th century, the confidant and adviser of Charlemagne, was born at York about the year 735. He was educated at the cloister-school of his native city, under the care of Archbishop Egbert and Ethelbert, and succeeded the latter as master of the school in 778. Three years later, on his return journey from Rome with the *pallium* of the new Archbishop of York, he met Charlemagne at Parma; and the year after he yielded to the invitation of the monarch, and took up his residence at his court at Aix-la-Chapelle. Here he devoted himself first to the education of the royal family itself, and through his influence the court became a school of culture for the hitherto almost barbarous Frankish empire. Even the great emperor himself sometimes took his place as a pupil in the school, and he gave his master the revenues of three abbeys for his support. In 790 Alcuin was sent to England to renew the peace with King Offa of Mercia. Two years later he returned, and soon afterwards became involved in the controversy against the Adoptionist heresy. In 796 he retired from the court, and settled at Tours, of which he had been made abbot. The school here soon became, under his fostering care, one of the most important in the empire, and the nursery for other schools elsewhere. While living at Tours, he corresponded constantly with Charlemagne. He died here in 804. Alcuin is more famous for the influence he exerted than for any work he gave to the world himself. His writings have but little profundity, nor, indeed, have his Latin poems much artistic merit; but he gave a powerful stimulus to Western learning, and occupies a conspicuous place in the history of letters as the apostle of culture and urbanity in a rude and indeed almost barbarous age. His prose writings mainly consist of elementary scholastic works on grammar, rhetoric, and dialectics; theological works, including biblical commentaries, and treatises on the dogma of the Trinity, and on practical morals; lives of several saints: one, Saint Willibrod, especially interesting to Englishmen; and over two hundred letters to Charlemagne, to friends in England, and to Arnulf of Salzburg, his friend and pupil. The best collected edition of his works is that of Frobenius, which appeared at Ratisbon in 1777. It has been reprinted in two volumes of Migne's great *Patrologia Cursus Completus*, edited by Angelo Mai (1851). See the Life of Alcuin by Lorenz (1829); Monnier's *Alcuin et Charlemagne* (1864); Mullinger's *Schools of Charles the Great* (1877); and Werner's *Alcuin und sein Jahrhundert* (1881).

Alecyonaria, one of the two orders of Actinozoa (q.v.), including polyps, with eight tentacles and radial partitions. They usually form colonies, and have always some kind of skeleton. Dead-men's fingers, sea pens, red corals, and organ-pipe corals, are common representatives of the order.

Alcyonium, or DEAD-MEN'S FINGERS, an exceedingly common colenterate of the sub-class Actinozoa, belonging to the same order (Alecyonaria) as the sea-pen, the red coral, the organ-pipe coral, &c. It is often found on the coast, in somewhat deep water, as an irregularly lobed mass of a white, creamy, or orange colour, attached to stones and shells. The whole varied clump, which is frequently about the size of a man's hand, whence the popular name, is not one animal, but a myriad colony. When undisturbed, the countless individual polyps may be seen projecting from

the surface like miniature sea-anemones, about the size of a snail's horns (fig. 1). Each polyp consists of



Fig. 1.
A stock of *Alcyonium*, showing individual polyps.
(After Johnston.)

a contractile tube with a crown of tentacles round a slit-like mouth, and with the margin of the latter

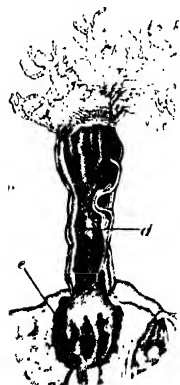


Fig. 2.
Longitudinal section of a single polyp at maximum extension, showing pinnate tentacle round mouth, neck region, protruded stomach tube (*d*), and lower gastral region with suggestion of mesenteries (*e*).
(Vogt and Yung.)

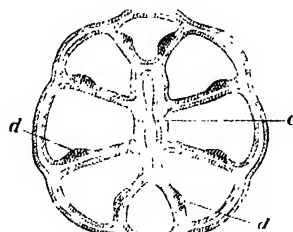


Fig. 3.
Cross section at level of mesenteries (from Vogt and Yung, after Hertwig), showing the body wall with its three layers, the radial mesenteries (*d*) with intervening elevations, and the central mouth narrowed stomach tube (*c*).

prolonged inwards to form an inner stomach tube connected with the outer wall by radial partitions

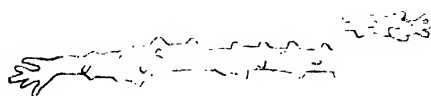


Fig. 4.
Large spicules from Neck Region. (Vogt and Yung.)

or mesenteries (fig. 2). So far the general structure

is that of a sea-anemone, but in all *Alcyonaria*, and in *Alcyonium* among the rest, there are eight, and not six, tentacles and mesenteries, and the latter are never calcified. The expanded tentacles are seen to be irregularly pinnate, and bear the usual stinging cells. The neck region, below the base of the tentacles, is strengthened by the formation of knotted spicules (see fig. 4). In the lowest portion of the polyp, which always remains sunk within the stock, the eight mesenteries are very strongly developed, and leave only a small central tube (fig. 3). They exhibit certain coiled fringes, with an important digestive function, and further bear on their sides either eggs or sperms, as the colony happens to be male or female. All these individuals thus briefly described as minute sea-anemones are sunk in a clear, structureless mass, gradually formed as the connecting stock of the colony. The cavities of the individual polyps are continuous with canals traversing the stock, and these are again in connection with a finer network riddling and irrigating the entire mass. The common life of the colony is thus harmoniously sustained. The stock also includes a few muscle-fibres, and abundant irregular tiny spicules. *Alcyonium* is unisexual. Asexual multiplication by budding continually occurs; and this takes place not directly from individual polyps, but from the stock, by changes brought about through the above-mentioned canals. The common species is *Alcyonium digitatum*, and of this several varieties occur. A giant species (*Alcyonium ponicum*), found on the coral reefs of Sumatra and in the neighbourhood of Singapore, attains nearly 3 feet in height and 18 inches in diameter. There are two other compound animals with somewhat similar names, *Alcyonidium* and *Alcyonella*, which used also to be ranked as zoophytes, but are now known to belong to the widely separated class of Polyzoa (q.v.). See *ALCYONARIA*, *CELESTERATA*, *SEA-ANEMONE*, *ZOOPLUTE*, &c.



Fig. 5.
Small Portion of a Colony.

Aldborough, a decayed town, now a mere village, of the West Riding of Yorkshire, on the river Ure and on Watling Street, $7\frac{1}{2}$ miles S.E. of Ripon. Till 1832 it sent two members to parliament. Extensive remains of the Roman town of Isurium have been found here. There is a small seaport and watering-place of the same name on the coast of Suffolk, 29 miles N.E. of Ipswich by rail. It also was disfranchised in 1832; but in 1885 it received a new municipal charter. It has a quaint, half-timbered Moot Hall; and in the church is a bust of the poet Crabbe, who was a native. Pop. (1881) 2106.

Aldebaran, the Arabic name of a star of the first magnitude in the constellation Taurus. It is the largest and most brilliant of a cluster of five which the Greeks called the Hyades. From its position it is sometimes termed 'the Bull's Eye.'

Aldegondé. See *MARNIX*.

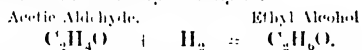
Aldehyde, CH_3COH , is a volatile fluid produced by the oxidation and destructive distillation of alcohol and other organic compounds. There are many modes of obtaining it; the following is the method described by Liebig: A mixture of 2 lb. of strong alcohol, 2 lb. of water, and 3 lb. of sulphuric acid, is distilled into a receiver kept cool by ice. As soon as the distillate reddens litmus-paper, the operation is stopped. The product in the receiver, weighing about 3 lb.,

is then twice rectified over chloride of calcium, being reduced by these operations to about 12 oz. This is then mixed with twice its volume of ether, and saturated with ammonia gas. After cooling, crystals of aldehyde ammonia, $C_2H_4ONH_3$, are formed, which are mixed with dilute sulphuric acid, and distilled at a low temperature. The hydrated aldehyde thus obtained is dried with chloride of calcium and again rectified by distillation. The aldehyde thus prepared is a thin, transparent, colourless liquid, very inflammable, burning with a blue flame, and having a spec. gr. of .800, a boiling-point of about $70^\circ F.$ ($21^\circ C.$), and a pungent, suffocating odour. It mixes in all proportions with water, alcohol, and ether, and dissolves sulphur, phosphorus, and iodine. As is shown in the article ALCOHOL, it constitutes an intermediate stage in the oxidation of alcohol into acetic acid. When potassium is gently heated with aldehyde, one atom of H is replaced by one of K, the resulting compound being aldehyde of potash, CH_3COK . Various compounds of this kind may be formed, of which the most important is aldehyde of ammonia, or aldehyde-ammonia, $C_2H_4ONH_3$, which is obtained in transparent shining crystals, and is a compound that has led chemists to the discovery of a large number of very remarkable derivatives.

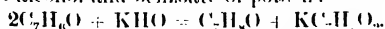
ALDEHYDES are a class of organic compounds intermediate between primary alcohols and acids. Each aldehyde is derived from the corresponding alcohol by the abstraction of two atoms of hydrogen, and each aldehyde is converted into its corresponding acid by the addition of one atom of oxygen.

Ten aldehydes of C_2H_4O , corresponding to $n = 1, 3, 4, \dots, 8, 11, 12$, and 16, are at present known, the simplest being formic aldehyde, CH_2O , and the highest being picrotoxic aldehyde, $C_{16}H_{32}O$.

Amongst aldehydes not connected with the preceding group may be mentioned various organic compounds which have been recently shown to belong to this class: thus, acrolein, C_3H_4O , is acrylic aldehyde; camphor, $C_{10}H_{16}O$, is camphoric aldehyde; bitter-almond oil, C_6H_6O , is benzoic aldehyde; oil of cinnamon, C_9H_8O , is cinnamic aldehyde; oil of cinnamon, C_9H_8O , is cinnamic aldehyde. Most of these aldehydes are obtained directly from plants, and either exist in them ready formed, or are given off as volatile oils on distillation with water. Owing to their great tendency to oxidise into their corresponding acids, the aldehydes are powerful reducing agents. They reduce the silver in silver salts to the metallic state. On the other hand, by the action of nascent hydrogen upon the aldehydes, the corresponding alcohols are regenerated. Thus ordinary alcohol may be obtained from ordinary aldehyde.

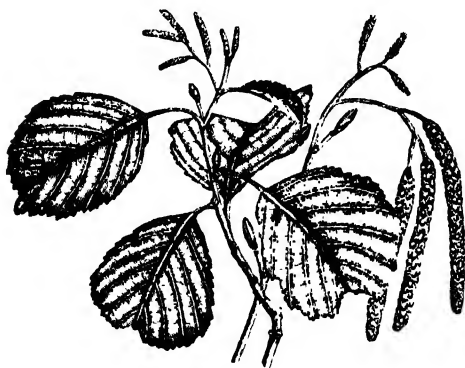


With the acid sulphites of the alkalis the aldehydes form sparingly soluble crystalline compounds. When treated with caustic alkali, many of the aldehydes are converted into the corresponding alcohols, and the potassium salt of the corresponding acid. Thus benzoic aldehyde yields benzyl alcohol and benzoate of potash:



The aldehydes have a great tendency to form polymeric compounds. Thus ordinary aldehyde passes readily into two polymeric modifications (see ISOMERISM): (1) Paraldehyde, a liquid which boils at $255^\circ F.$ ($124^\circ C.$); (2) Metaldehyde, a solid body which sublimes at $248^\circ F.$ ($120^\circ C.$), and is converted back into ordinary aldehyde by heating to $239^\circ F.$ ($115^\circ C.$) for a few hours in a closed vessel.

Alder (*Alnus*), a genus of plants of the natural order Betulaceae (regarded by many as a sub-order of Amentaceae; see also BIRCH). The genus consists entirely of trees and shrubs, natives of cold and temperate climates; the flowers in terminal, imbricated catkins, which appear before the leaves; the male and female flowers in separate catkins on the same plant; fruit, a compressed nut without wings. The COMMON or BLACK ALDER (*A. glutinosa*) is a native of Britain, and



Common Alder (*Alnus glutinosa*).

of the northern parts of Asia and America. It has roundish, wedge-shaped obtuse leaves, lobed at the margin and serrated. The bark, except in very young trees, is nearly black. It succeeds best in moist soils, and helps to secure swampy river-banks against the effects of floods. It attains a height of 30 to 60 feet. Its leaves are somewhat glutinous. The wood is of an orange yellow colour, not very good for fuel, but affording one of the best kinds of charcoal for the manufacture of gunpowder, upon which account it is often grown as coppice-wood. Great numbers of small alder trees are used in Scotland for making staves for herring barrels. The wood is also employed by turners and joiners; but it is particularly valuable on account of its property of remaining for a long time under water without decay, and is therefore used for the piles of bridges, for pumps, sluices, pipes, cogs of mill-wheels, and similar purposes. The bark is used for tanning and for dyeing, also for staining fishermen's nets. It produces a yellow or red colour, or with copper, a black colour. The leaves and female catkins are employed in the same way by the tanners and dyers of some countries. The bark is bitter and astringent, and has been used for gargles, and also administered with success in ague. The seeds are a favourite food of greenfinches. In boggy grounds the alder is often almost the only kind of tree, and in many parts of the Highlands, groups of alders are scattered over the lower and moister parts of the mountain-slopes. There are several handsome varieties of the common alder employed in ornamental planting, the most distinct being the GOLDEN ALDER, the leaves of which are bright golden yellow; and the CUT-LEAVED ALDER, with narrow, deeply incised leaves, and a much more graceful habit than the common form. The common alder ceases on the Swedish shore on the lower part of the Gulf of Bothnia. The GRAY or WHITE ALDER (*A. incana*), a native of many parts of continental Europe, especially of the Alps, and also of North America and of Kamchatka, but not of Britain, differs from the common alder in having acute leaves, downy beneath, and not glutinous. It attains a rather greater height, but in very cold climates and unfavourable situations appears as

a shrub. The wood is white, fine grained, and compact, but readily rots under water. The bark is used in dyeing. —1. *cortifolia* is a large and handsome tree, with cordate acuminate leaves, a native of the south of Italy, but found to be quite hardy in England. Some of the American species are mere shrubs. Several species are natives of the Himalayas. —THE BERRY-BEARING ALDER, or BREAKING BUCKTHORN, is a totally different plant (see BUCKTHORN).

Alderman, a title derived from the Anglo-Saxon *ealdorman*, compounded of *ealdor* ('older') and *man*. Whether any definite and invariable functions were connected with the ancient rank of *ealdorman* does not seem to be very clearly ascertained. The term was generally applied to persons of high and hereditary distinction, such as princes, earls, and governors. Its special significance in the titles 'Alderman of all England' (*Aldermannus totius Angliæ*) and 'King's Alderman' (*Aldermannus Regis*) is not distinctly indicated. There were also aldermen of counties, hundreds, cities, boroughs, and castles. In modern times, aldermen are officers invested with certain powers in the municipal corporations of England, Wales, and Ireland, either as civil magistrates, or as assessors of the chief magistrates in cities and towns corporate. The corresponding title in Scotland is Bailie. The London Court of Aldermen consists of twenty-six aldermen, including the Lord Mayor, and constitutes the bench of magistrates for the city, having besides certain judicial and financial powers.

Alderney (Fr. *Aurigny*, Lat. *Rāduna*), a British island in the English Channel, 55 miles S. by E. of Portland Bill, 15 N.E. of Guernsey, 31 N. of Jersey, and 10 W. of Cape la Hogue. The Race of Alderney, or strait that separates it from the coast of Normandy, is very dangerous in stormy weather. The length of the island is $4\frac{1}{2}$ miles; its extreme breadth, $1\frac{1}{2}$ mile; and its area is 1962 acres, or 3 sq. m. The highest point is 281 feet above sea-level. To the S. the coast is bold and lofty; to the N. it descends, forming numerous small bays, one of which has been formed into a fine, though uncompleted, harbour, with a granite breakwater, at a cost, including strong fortifications, of more than £1,250,000. The Caskets are a small cluster of dangerous rocks, $6\frac{1}{2}$ miles to the W., on which are three lighthouses. The soil in the centre of the island is highly productive; and the Alderney cattle (see CATTLE), a small but handsome breed, have always been celebrated. The climate is mild and healthy, and good water abounds. Education to some extent is universal. The population was originally French, but half the inhabitants now speak English, and all understand it. Protestantism has prevailed here since the Reformation. Alderney is a dependency of Guernsey, and subject to the British crown. The civil power is vested in a judge appointed by the crown, and six *jurats* chosen by the people. These, with twelve popular representatives or *douzeniers* (who do not vote), constitute the local legislature. The 'town' of St Anne is situated in a picturesque valley near the centre of the island. It has an Albert memorial in the shape of a Gothic arch, and a cruciform church (1859) in the Early English style, with a tower 104 feet high. Pop. of island (1841) 1038; (1861) 1952; (1881) 2018. See CHANNEL ISLANDS.

Aldershot Camp, a permanent camp, at exercise on the confines of Hampshire, Surrey, and Berkshire, 35 miles S.W. of London, and 181 S. of Windsor. It was established in 1855 after the Crimean war, to provide for practical instruction in tactics, outpost duties, and other exercises re-

quiring a wide tract of country and large bodies of troops—such as brigades and divisions—for which no opportunity had previously been given to the British army, except at the temporary camp at Chobham in 1853. About three square miles of moorland, called Aldershot Heath, was purchased by government, deemed suitable as being distant from any thickly inhabited district, with three or four railway stations communicating with London, Southampton, Portsmouth, Reading, and Guildford, and from its situation on the Bagshot Sands likely to be, as it has proved, extremely healthy. Here the wooden huts, each furnishing living and sleeping room for twenty-five men, which had been used latterly in the Crimea, and others of the same pattern, were erected. These are being superseded gradually by brick huts and barracks, the finest in the country, the cost of the camp having been upwards of £1,250,000 during the first five years. The Basingstoke Canal, running directly across the Heath, has occasioned a division into North Camp and South Camp, each of which is capable of considerable extension. The huts and a large brick hospital for 250 sick stand on a high level plateau; and below them, to the south, are the so-called permanent barracks, accommodating three battalions of infantry, three regiments of cavalry, and three batteries of artillery. Around the camp are many square miles of plain, heath, scrub, morass, valley, and hill, also the property of government, and available for manoeuvres. There are usually from 10,000 to 15,000 troops of all arms at the camp, several militia battalions under canvas during the summer, and many volunteers who spend fourteen days at a time in tents. The troops are under the command of a lieutenant general, and are divided into three infantry and one cavalry brigade, each under a major-general. The artillery are also under a major-general, and the engineers under a colonel on the staff. There are large bodies of the Commissariat, Transport, Ordnance Store, and Medical Staff Corps, and the camp is the centre of instruction for Bearer Companies (q.v.), army-signalling, field-firing, field-cookery, and military gymnastics, for which a large gymnasium is provided. There is also a school of instruction for officers of yeomanry cavalry, a fine military library, called after the Prince Consort, and churches for every denomination. Troops of the regular army are generally quartered at Aldershot for the two years preceding their embarkation for India. A considerable town has sprung up near the camp, with a civil population of (1881) 12,875, as against 875 in Aldershot parish in 1851.

Small similar camps exist at the Curragh of Kildare in Ireland, and at Shorncliffe near Dover; but that at Aldershot is at the same time the largest and most complete garrison in the United Kingdom, and the headquarters of practical military work in the field.

Aldhelm, Saxon abbot about 640, was educated at Malmesbury and Canterbury, and became abbot of Malmesbury about 673, Bishop of Sherborne in 705. He died in 709. A skilled architect, he built the fifth church still standing at Bradford in Wiltshire; a great scholar, he wrote Latin treatises, letters, and verses, besides English poems that have perished. His extant works are published in Dr Giles' *Poetes Eccles. Angli.* (Oxford, 1844).

Aldine Editions, the name given to the works that issued (1490–1597) from the press of Aldo Manuzio and his family in Venice. Recommended by their intrinsic value, as well as by their handsome exterior, they have been highly prized by the learned and by book-collectors. Many of them are the first editions (*editiões principes*) of Greek and

Roman classics; others contain corrected texts of modern classic writers, as of Petrarch, Dante, or Boccaccio, carefully collated with the MSS. All of them are distinguished for the remarkable correctness of the typography; the Greek works, however, being in this respect somewhat inferior to the Latin and Italian. The editions published by Aldo Manuzio (1450-1515), the father, form an epoch in the annals of printing, as they contributed in no ordinary measure to the perfecting of types. No one had ever before used such beautiful Greek types, of which he got nine different kinds made, and of Latin as many as fourteen. It is to him, or rather to the engraver, Francesco of Bologna, that we owe the types called by the Italians *Corsivi*, and known to us as Italics, which he used for the first time in the 8vo edition of ancient and modern classics, commencing with Virgil (1501). Manuzio's impressions on parchment are exceedingly beautiful; he was the first printer who introduced the custom of taking some impressions on finer or stronger paper than the rest of the edition—the first example of this being afforded in the *Epistolæ Græcæ* (1499). From 1515 to 1533 the business was carried on by his father and brothers-in-law, Andrea Torresano of Asola, and his two sons, the three 'Asolani.' Paolo Manuzio (1512-74), Aldo's son, possessed an enthusiasm for Latin classics equal to that of his father for Greek; and he was succeeded by his son, the younger Aldo (1547-97). The printing establishment founded by Aldo continued in active operation for 100 years, and during this time printed 908 different works. The distinguishing mark is an anchor, entwined by a dolphin, with the motto either of *Festina lente* or of *Suberit et ulsit*. The demand which arose for editions from this office, and especially for the earlier ones, induced the printers of Lyons and Florence, about 1502, to begin the system of issuing counterfeit Aldines. The Aldo mania has considerably diminished in later times. Among the Aldine works which have now become very rare, may be mentioned the *Hebre Beata Maria Virginis* of 1497, the *Virgil* of 1501, and the *Rhetores Græci*; not to mention all the editions, dated and undated, from 1490 to 1497, which are now extremely rare. See Renouard's *Annales de l'imprimerie des Aldes* (1834), and Didot's *Aldi Manuæ* (1873).

Aldred (also Ealdred or Alred) was recessively, during the 11th century, abbot of Tavistock, Bishop of Worcester, and Archbishop of York. After his promotion to the see of Worcester in 1046, he undertook several diplomatic missions to the Continent: a journey which he made to Jerusalem in 1058 was a remarkable one for the times. He took an active share in the politics of his time. It has been alleged, on doubtful authority, that he crowned Harold in 1066; he certainly crowned William the Conqueror, and proved a faithful servant to the Norman king. He was active and courageous, but ambitious, greedy, and self-seeking. His appointment to the archbishopric of York in 1060 was confirmed by the pope only on condition that he resigned his former post. Aldred died at York, September 11, 1069. See vols. ii. to iv. of Freeman's *Norman Conquest*.

Aldrich, HENRY, born at Westminster in 1647, passed in 1662 from Westminster School to Christchurch, Oxford, of which he became a canon in 1682, and dean in 1689. He designed the Peckwater Quadrangle, and wrote the well-known catch, 'Hark, the bonny Christchurch Bells.' But he is less remembered as architect or composer, or even as an inveterate smoker, than as the author of the *Artis Logice Compendium* (1691), of which a new edition appeared in 1862. He died 14th December 1710.

Aldrich, THOMAS BAILEY, an American poet and novelist, was born at Portsmouth, New Hampshire, U.S., November 11, 1836. While engaged in a New York counting-house, he began to contribute verse to the newspapers, and soon after the publication of *The Bells* (1855), adopted journalism as a profession. He contributed in prose and verse to some of the principal magazines, and became editor of the *Atlantic Monthly* in 1881. Among his novels are *Daisy's Necklace* (1857); *Story of a Bad Boy*; *Murjory Dane*; *Prudence Palfrey*; *Queen of Sheba*; *Stillwater Tragedy*. In 1874 he published a selection of his poems under the title *Cloth of Gold, and other Poems*, and in 1881 his popular *XXXVI Lyrics and XII Sonnets*. Through his prose, Aldrich has taken a high place for descriptive power and gift of humour; his verse includes some of the daintiest work yet produced in America.

Aldridge, IRA, negro tragedian, born about 1805 in Senegambia, in 1825 came to Glasgow from New York to study for a missionary career; but next year, forsaking the pulpit for the stage, made his debut as 'Othello' in a small London theatre. He played in the provinces till 1852; then on the Continent won a high reputation, which London refused to indorse (1857); and finally died at Lodz in Poland, 7th August 1867.

Aldrovandi, ULYSSES, one of the most distinguished naturalists of the 16th century, was born at Bologna in 1522. He was educated partly in his native city, and partly at Padua. In 1550 he was imprisoned as a heretic at Rome; and after his liberation wrote a treatise on ancient statuary. Having taken his degree in medicine at the university of Bologna in 1553, he occupied successively the chairs of Botany and Natural History there, and practised medicine for some time. He established the Botanical Garden at Bologna in 1567, and was for many years engaged in forming a museum of natural history. All his studies and collections were made subservient to his work on Natural History, the first volume of which on Birds appeared in 1599. Six volumes appeared during Aldrovandi's life; other seven were published from his manuscripts after his death, which took place in 1605. His work on Botany was also of great importance, and he was the first to collect a real herbarium, as the word is now understood.

Ale would seem to have been the current name in England for malt liquor in general before the introduction of 'the wicked weed called hops' from the Netherlands, about the year 1521. The two names, *ale* and *beer*, are both Teutonic, and seem originally to have been synonymous. According to the *Alvisnål*, a didactic Scandinavian poem of the 10th century, it is called 'ale' among men, and among the gods, 'beer.' The word *ale* is still the name for malt liquor in the Scandinavian tongues (Swedish, Danish, and Icelandic, *öl*). The hopped liquor came to be called *beer*, and now this is the generic name in the trade for all malt liquors. The popular application of the two words varies in different localities. In the eastern counties of England, and over the greater portion of the country, *ale* means strong, and *beer*, small malt liquor; while in the west country, *beer* is the strong liquor, and *ale* the small. As now used, *ale* is distinguished from *beer* chiefly by its strength and the quantity of sugar remaining undecomposed. Strong ale is made from the best pale malt; and the fermentation is allowed to proceed slowly, and the ferment to be exhausted and separated. This, together with the large quantity of sugar still left undecomposed, enables the liquor to keep long without requiring a large amount of hops. The Scotch ales are distinguished for the

smallness of the quantity of hops they contain, and for their vinous flavour. They are fermented at an unusually low temperature. The ales of Edinburgh, Wrexham, and Alloa have a high reputation. Burton ale is the strongest made, containing as much as 8 per cent. of alcohol; while the best brown stout has about 6 per cent., and table-beer only 1 or 2 per cent. India pale ale differs chiefly in having a larger quantity of hops (see BEER and FERMENTATION). For the history of ale in our literature, see an interesting book by John Bickerdike, *The Curiosities of Ale and Beer* (1886).

Alecsandri. See ALEXANDRI.

Aleman. MATEO, a famous Spanish novelist, was born about the middle of the 16th century, at Seville, and died in Mexico in 1610. He was author of a metrical life of St Antony of Padua (1604), and an *Ortografía Castellana* (1608); but his great work is *Guzmán de Alfarache*, a novel with a rascal for the hero, which, first published in Madrid in 1599, in half-a-dozen years had run through twenty-six editions, consisting of not less than 50,000 copies. As regards both delineation of manners and purity of style, this masterly creation ranks next to that most celebrated of all the Spanish 'picaresque' novels, Mendoza's *Lazarillo de Tormes*.

Alemanni. the name of a confederacy of several German tribes which began to appear in the country between the Main and the Danube about the beginning of the 3d century. Caracalla (in 211 A.D.) and Alexander Severus fought against them unsuccessfully; but Maximinus at length drove them beyond the Rhine. After his death they again invaded Gaul, but were defeated and pursued into Germany. After 282, being pressed upon from the north-east by the Burgundians, they took up permanent settlements within the Roman boundary from Mainz to Lake Constance. Julian repelled one of their repeated incursions into Gaul in 357. After the 5th century, the confederated nation is spoken of as Alemanni and Snavi or Snevi. In the course of the 4th century, they had crossed the Rhine, and extended as far west as the Vosges, and south to the Alps. At length Clovis broke their power in 496, making them subject to the Frankish dominion; and the southern part of their territory was formed into a duchy called Alemannia. The name of Swabia came to be applied to the part of the duchy lying east of the Rhine. From the Alemanni the French have given the name of *Allemands* and *Allemagne* to Germans and Germany in general, though the proper descendants of the Alemanni are the inhabitants of the north of Switzerland, of Alsace, and part of Swabia.

Alembert. See D'ALEMBERT.

Alembic (Arabic *al-anbiq*, 'the still') is a form of still introduced into chemistry by the alchemists, and used by the more ancient experimenters in manipulative chemistry for the distillation and sublimation of substances such as alcohol, or formic acid, obtained by heating a decoction of red ants in water. The alembic has now been entirely superseded by the retort and receiver, or by the flask attached to a Liebig's condenser. See RETORT.

Alemtejo, a province in the south of Portugal, with an area of 9381 sq. m. It is the largest but most sparsely peopled of the Portuguese provinces, lies N. of Algarve, and stretches from the Atlantic to the Spanish frontier. It is traversed by a number of mountain-chains, and is watered by the Tagus, Guadiana, and Sado or Sado. In the south and west, the climate is hot and dry; the plains are covered with brown heath, broken at intervals by marshy wastes, while the vegetation is extremely scanty. In the east, on the contrary, the valleys are fertile, and the mountains

adorned with forests. The productions include wheat, barley, rice, maize, wine, and fruits. Swine, goats, and sheep are reared; mining, which might be profitably carried on, is neglected. The chief towns are Évora (the capital), Elvas, and Portalegre. Pop. (1881) 367,169.

Alençon. chief town of the Norman department of Orne, on the Sarthe, 68 miles SSE. of Caen. The cathedral of Notre Dame (1553-1617) is a Gothic edifice, with good stained glass and the remains of the tombs of the Alençon family, which were almost completely destroyed at the Revolution. The inhabitants produce excellent woollen and linen stuffs, embroidered fabrics, straw-hats, lace-work, artificial flowers, hosiery, &c. The manufacture of the famous Alençon point-lace (*point d'Alençon*) employs barely a tenth part of the 20,000 hands that once engaged in it (see LACE). The cutting of the so-called Alençon diamonds (quartz-crystals), found in the vicinity of the town, is an industry which has also greatly declined. Pop. (1881) 15,939.

The old Dukes of Alençon were a branch of the royal family of Valois, being descended from Charles of Valois, who perished at the battle of Crecy in 1346. His grandson, John I., fell at Agincourt in 1415. René, son of John II., was confined by Louis XI. for three months in an iron cage at Chinon. René's son, who had married the sister of Francis I., commanded the left wing at the battle of Pavia. With him expired the old House of Alençon. The duchy was then given to the Duke of Anjou, brother of King Charles IX. Louis XIV. conferred it upon his grandson the Duc de Berri, and Louis XVI. on his brother the Comte de Provence. More recently the title has been borne by the son of the Duc de Nemours, who was son of Louis-Philippe.

Aleppo (Italianised form of *Halab*), a town in the north of Syria, capital of a Turkish province between the Orontes and the Euphrates, in a fruitful valley watered by the Kuweik. It stands in a large hollow, surrounded by rocky hills of limestone, and beyond is mere desert. The fruitful gardens, celebrated for their excellent plantations of pistachios, are the sole contrast to the desolation which environs the city, whose numberless cupolas and minarets, clean, well-paved streets, and stately houses, make it even yet one of the most beautiful in the East. Formerly it was a principal emporium of trade between Europe and Asia, and was the centre of many of the chief trade routes; especially before the discovery of the sea route to India. It supplied a great part of the East with fabrics of silk, cotton, and wool, and gold and silver stuffs; but in 1822 an earthquake swallowed up two thirds of the inhabitants, and transformed the citadel into a heap of ruins. The plague of 1827, the cholera of 1832, and the oppression of the Egyptian government, all but completed its destruction. It has only partially recovered from its misfortunes.

It is still the principal emporium of the inland commerce of Northern Syria. Its port is Alexandretta or Skanderoun. Aleppo has a large trade in cotton and silk goods, skins, tobacco, wine, and oil; and manufactures much-admired cloth (of silk, cotton, wool; flowered and striped), carpets, cloaks, and cap. English goods are largely imported, and the exports are considerable. The trade is mainly in the hands of the native Christians (Greeks and Armenians), who may number 20,000, and have interspersed the European houses that used to be established here. The Jews, 5000 in number, are a very important and wealthy community, occupying a special quarter of the city. The Mohammedans here are less bigoted than in some other cities of Syria; but religious riots sometimes occur—notably in 1850 and 1862. The climate is dry

and not unhealthy; but residents are subject to a painful disorder called Aleppo boils, which most usually break out in the faces of children, last for a year or more, and disfigure the countenance badly. The pop., usually stated at 70,000, was estimated in 1883 at 125,000. Aleppo is a telegraph station in connection with Damascus and with Diarbekir, on the Indo-European line.

Aleshki (formerly *Dnieprovsk*), a Russian town in the government of Taurida, on the Dnieper, noted for its melon culture and its fisheries. Pop. 8915.

Alesia, a town in the east of ancient Gaul, the siege and capture of which formed one of Caesar's greatest exploits. Vercingetorix, after several defeats, had shut himself up with 80,000 Gauls in Alesia, which was situated on a lofty hill. Caesar, with his army of 60,000 men, completely surrounded the place; and in spite of the desperate efforts of the besieged, the town was obliged to surrender. Alesia was destroyed by the Normans in 864. Near the site stands the modern village of Alise-Sainte-Reine, in Côte d'Or, W. of Dijon. On the hill Napoleon III. erected in 1864 a colossal statue of Vercingetorix.

Alesius, ALEXANDER, a noted divine and Reformer, whose name was originally Alame, was born in Edinburgh on 23d April 1500. He studied at St Andrews, and became canon of the collegiate church there. Won over to the side of the Reformers, he was obliged to flee to the Continent, and in his absence he was tried and condemned. He eventually settled down at Wittenberg, signed the Augsburg Confession, and gained the friendship of Melancthon. In 1535 Alesius came over to England, was well received by Crommer and Cromwell, and lectured for a time on theology at Cambridge; but the persecuting statute, the 'Six Articles,' compelled him to return to Germany. He was successively appointed to a theological chair in the universities of Frankfurt-on-the-Oder and Leipzig; and had an active and influential share in several episodes of the Reformation in Germany. He died at Leipzig, 17th March 1565. He wrote some thirty exegetical and polemical works.

Alessandria, the principal fortress and town of the province of the same name in the north of Italy, is situated in a marshy country near the confluence of the Bormida and Tanaro, 58 miles ESE. of Turin. It was built in 1168 by the inhabitants of Cremona, Milan, and Placentia, as a bulwark against the Emperor Frederick I., and was afterwards called Alessandria in honour of Pope Alexander III. It was taken and plundered in 1522 by Duke Sforza; besieged by the French in 1657; and again taken by Prince Eugene in 1707. In 1800, Bonaparte here concluded an armistice. It was the principal stronghold of the Piedmontese during the insurrection of 1818-9. The citadel is still one of the strongest fortresses in Italy, of enormous size, larger than many a town; and in war the whole surrounding country can be inundated by means of the sluices of the Tanaro. The city contains, exclusive of the garrison, (1881) 30,761 inhabitants, who carry on a trade in linens, woollens, silk fabrics, stockings, and wax-candles. The richly decorated cathedral was rebuilt in 1823. Two great fairs are held here annually. The city is the meeting-point of several railway lines.—The province has an area of 1980 sq. m., and a pop. of (1881) 729,710. It is a fertile plain on the east, and the west is hilly, with rich wooding.

Aletsch, the largest glacier (12½ miles long) in Europe, sweeps round the southern side of the Jungfrau. Following the valley in a majestic

curve, it is distinguished by the title Great Aletsch from its two tributary glaciers, the Upper and Middle Aletsch, which branch off to the north-west. At its eastern extremity lies a deep-blue mountain lake, the Merjelen-See (7711 feet), into which huge blocks of detached ice frequently fall. To the NW. lies the Aletschhorn (13,773 feet), the second highest peak in the Bernese Alps, which was first ascended by Mr Tuckett in 1859.

Aleutian Islands, sometimes called the Catharine Archipelago in honour of Catharine II. of Russia, is the name of a chain of about 150 islands, in several groups, extending westward from the American peninsula of Alaska, and forming an insular continuation of that peninsula towards the Asiatic peninsula of Kamchatka. These islands are chiefly included in the United States territory of Alaska, and lie in lat. 53° N., separating the Sea of Kamchatka on the north from the Pacific Ocean on the south, and are naturally divided into five groups, ranging from east to west in the following order: (1) The Fox Islands, near the extremity of Alaska, of which the largest, Ooninuk, is also the largest of the Aleutian chain; other principal islands of this group are Oonalashka and Oomnak. (2) The Andreanov Islands, of which the largest is Atka. (3) The Rat (Kreesi) Islands, of which the most important are Keeska, Amchitka, and Semisopochnoi. (4) The Blizhni (Nearer) Islands, so called by the Russians from their nearer proximity to Kamchatka; of these the largest is Attoo, the westernmost of the true, or American, Aleutian Islands. (5) Komandorski, or Commander's Islands, a Russian group, lying near Kamchatka, the principal being Behring Island, named from Behring (Bering), a commander in the Russian service, who died here in 1741.

This chain of islands, apparently a continuation of the main Alaskan range of mountains, contains numerous volcanic peaks, some of which are in a state of moderate activity. In some instances these peaks rise from 1000 to 8000 feet high, and are covered with snow. Few trees, and those of stunted growth, are found on these islands, but grasses grow in abundance. Some efforts have been made to cultivate the more common garden vegetables, but with indifferent success.

The aborigines of these islands are believed to have been of Eskimo origin, but since their subjugation by adventurous Russians about the middle of the 18th century, such intimate relations with their conquerors have been maintained, that they have measurably lost their individuality as a tribe. They profess the religion of the Greek Church. At Iliulink, on the island of Oonalashka, are the parish church, the custom-house, and important trading establishments. The islands abound in springs, and are overrun with foxes, dogs, and reindeer, while the coasts swarm with fish, seals, and otters. The inhabitants are reckoned about 2000. Their occupation is hunting and fishing, and their trade is chiefly in furs and fish. See *Alaska and its Resources*, by William H. Dall (1870); *Alaska: its Population, Industries, and Resources* (Tenth Census of the United States), by Ivan Petroff, special agent.

Alewife (*Alosa tyrannus*), a fish of the same genus with the Shad (q.v.), which, in the end of spring and beginning of summer, appears in great numbers on the eastern coast of North America, and enters the mouths of rivers to spawn. It appears in Chesapeake Bay in March, on the coasts of New York and New England in April, and on those of the British provinces about the 1st of May. It abounds in the Bay of Fundy, but is more rare in the Gulf of St Lawrence; and the Bay of Miramichi appears to be its northern limit. It ascends

rivers only as far as the tide extends, and after spawning, returns to the sea in the middle of summer. It prefers a soft, muddy bottom. Its length is not more than 12 inches. The alewife is called *spring herring* in some places, and *gaspereau* by the French Canadians. In the United States it is considered much superior to the herring. The fishery is prosecuted in the rivers, by small-meshed seine-nets set across the stream. Large quantities are taken in the rivers of New England, New Brunswick, and Nova Scotia. The harbour of St John's, New Brunswick, alone produces from 12,000 to 20,000 barrels annually. This fish, in a salted state, forms a considerable article of export from the northern parts of America to the West Indies.

Alexander the Great, son of Philip of Macedon and Olympias, daughter of Neoptolemus of Epirus, was born at Pella, 356 B.C. His mind was formed chiefly by Aristotle, who instructed him in every branch of human learning, especially in the art of government. Alexander was 16 years of age when his father marched against Byzantium, and left the government in his hands during his absence. Two years afterwards, he displayed singular courage at the battle of Charonea (338 B.C.), where he overthrew the Sacred Band of the Thebans. 'My son,' said Philip, as he embraced him after the conflict, 'seek for thyself another kingdom, for that which I leave is too small for thee.' The father and son quarrelled, however, when the former divorced Olympias. Alexander took part with his mother, and fled to Epirus, to escape his father's vengeance; but receiving his pardon soon afterwards, he returned, and accompanied him in an expedition against the Triballi, when he saved his life on the field. Philip, being appointed generalissimo of the Greeks, was preparing for a war with Persia, when he was assassinated (336 B.C.), and Alexander, not yet twenty years of age, ascended the throne. After punishing his father's murderers, he marched on Corinth, and in a general assembly of the Greeks he caused himself to be appointed to the command of the forces against Persia. On his return to Macedon, he found the Illyrians and Triballi up in arms, whereupon he forced his way through Thrace, and was everywhere victorious. But now the Thebans had been induced, by a report of his death, to take up arms, and the Athenians, stimulated by the eloquence of Demosthenes, were preparing to join them. To prevent this coalition, Alexander rapidly marched against Thebes, which, refusing to surrender, was conquered and razed to the ground. Six thousand of the inhabitants were slain, and 30,000 sold into slavery; the house and descendants of the poet Pindar alone being spared. This severity struck terror into all Greece. The Athenians were treated with more leniency.

Alexander, having appointed Antipater his deputy in Europe, now prepared to prosecute the war with Persia. He crossed the Hellespont in the spring of 334 B.C., with 30,000 foot and 5000 horse, attacked the Persian satraps at the river Granicus, and gained a complete victory, overthrowing to son-in-law of Darius with his own lance. As a result of the battle, most of the cities of Asia Minor at once opened their gates to the conqueror. Alexander restored democracy in all the Greek cities; and as he passed through Gordium, cut the Gordian-knot (q.v.), which none should loose but the ruler of Asia. During a dangerous illness at Tarsus, brought on by bathing in the Cydnus, he received a letter insinuating that Philip, his physician, had been bribed by Darius to poison him. Alexander handed the letter to Philip, and at the same time swallowed the draught which the latter had prepared. As soon as he recovered, he

advanced towards the defiles of Cilicia, in which Darius had stationed himself, with an army of 600,000 men. He arrived in November 333 B.C. in the neighbourhood of Issus, where, on the narrow plain between the mountains and the sea, the unwieldy masses of the Persians were thrown into confusion by the charge of the Macedonians, and fled in terror. On the left wing, 30,000 Greek mercenaries held out longer, but they, too, were at length compelled to yield. All the treasures as well as the family of Darius fell into the hands of the conqueror, who treated them with the greatest magnanimity. Overtures for peace, made by Darius on the basis of surrendering to Alexander all Asia west of the Euphrates, were rejected. Alexander now turned towards Syria and Phœnicia. He occupied Damascus, where he found princely treasures, and secured to himself all the cities along the shores of the Mediterranean. Tyre, confident in its strong position, resisted him, but was conquered and destroyed, after seven months of incredible exertion (332 B.C.). Thence he marched victoriously through Palestine, where all the cities submitted to him except Gaza; it shared the same fate as Tyre. Egypt, weary of the Persian yoke, welcomed him as a deliverer; and in order to strengthen his dominion here, he restored all the old customs and religious institutions of the country, and founded Alexandria in the beginning of 331 B.C. Thence he marched through the Libyan Desert, in order to consult the oracle of Ammon, whose priest saluted him as a son of Zeus; and he returned with the conviction that he was indeed a god. He then again set out to meet Darius; in October 331 B.C., a great battle was fought on the plain stretching eastward to Arbela. Notwithstanding the immense superiority of his adversary, who had collected a new army of more than a million men, Alexander was not for a moment doubtful of victory. Heading the cavalry himself, he rushed on the Persians, and put them to flight; then hastened to the assistance of his left wing, which, in the meanwhile, had been sorely pressed. He was anxious to make Darius a prisoner, but Darius escaped on horseback, leaving his baggage and all his treasures a prey to the conqueror. Babylon and Susa, the treasure-houses of the East, opened their gates to Alexander, who next marched towards Persepolis, the capital of Persia, which he entered in triumph.

The marvellous successes of Alexander now began to dazzle his judgment and to inflame his passions. He became a slave to debauchery, and his caprices were as cruel as they were ungrateful. In a fit of drunkenness, and at the instigation of Thais, an Athenian courtesan, he set fire to Persepolis, the wonder of the world, and reduced it to a heap of ashes; then, ashamed of the deed, he set out with his cavalry in pursuit of Darius. Learning that Bessus, the Bactrian satrap, held him a prisoner, he hastened his march, in the hope of saving him, but he found him mortally wounded (330 B.C.). He mourned over his fallen enemy, and caused him to be buried with all the customary honours: whilst he hunted down Bessus, who himself aspired to the throne, chasing him over the Oxus to Sogdiana (Bokhara). Having discovered a conspiracy in which the son of Parmenio was implicated, he put both father and son to death, though Parmenio himself was innocent of any knowledge of the affair. This cruel injustice excited universal displeasure. In 329 he penetrated to the furthest known limits of Northern Asia, and overthrew the Scythians on the banks of the Jaxartes. In the following year he subdued the whole of Sogdiana, and married Roxana, whom he had taken prisoner. She was the daughter of Oxyartes, one of the enemy's captains, and was

said to be the fairest of all the virgins of Asia. The murder of his foster-brother, Clitus, in a drunken brawl, was followed, in 327 B.C., by the discovery of a fresh conspiracy, in which Callisthenes, a nephew of Aristotle, was falsely implicated. For challenging Alexander's divinity, he was cruelly tortured and hanged.

In 326 B.C., proceeding to the conquest of India, hitherto known only by name, Alexander crossed the Indus near to the modern Attock, and pursued his way under the guidance of a native prince to the Hydaspes (Jhelum). He there was opposed by Porus, another native prince, whom he overthrew after a bloody contest, and there he lost his charger Bucephalus (q.v.); thence he marched as lord of the country through the Punjab, establishing Greek colonies. He then wished to advance to the Ganges, but the general murmuring of his troops obliged him, at the Hyphasis (modern Sutlej), to commence his retreat. On regaining the Hydaspes, he built a fleet, and sent one division of his army in it down the river, while the other followed along the banks, fighting its way through successive Indian armies. At length, having reached the ocean, he ordered Nearchus, the commander of the fleet, to sail thence to the Persian Gulf, while he himself struck inland with one division of his army, in order to return home through Gedrosia (Beluchistan). During this march his force suffered fearfully from want of food and water. Of all the troops which had set out with Alexander, little more than a fourth part arrived with him in Persia (325 B.C.). At Susa he married Stateira, the daughter of Darius, and he bestowed presents on those Macedonians (some 10,000 in number) who had married Persian women, his design being to unite the two nations. He also distributed liberal rewards among his soldiers. Soon afterwards he was deprived, by death, of his favourite Hephestion. His grief was unbounded, and he interred the dead man with kingly honours. As he was returning from Ecbatana to Babylon, it is said that the Magi foretold that the latter city would prove fatal to him; but he despised their warnings. On the way, he was met by ambassadors from all parts of the world.

Libya, Italy, Carthage, Greece, the Scythians, Celts, and Iberians. At Babylon he was busy with gigantic plans for the future, both of conquest and civilisation, when he was suddenly taken ill after a banquet, and died eleven days later, 323 B.C., in the 33d year of his age, and the thirteenth of his reign. His body was deposited in a golden coffin at Alexandria, by Ptolemaeus, and divine honours were paid to him, not only in Egypt, but in other countries. He had appointed no heir to his immense dominions; but to the question of his friends, 'Who should inherit them?' he replied, 'The most worthy.' After many disturbances, his generals recognised as kings the weak-minded Aridaeus a son of Philip by Philina, the dancer, and Alexander's posthumous son by Roxana, Alexander Egeus, while they shared the provinces among themselves, assuming the title of satraps. Perdiccas, to whom Alexander had, on his death-bed, delivered his ring, became guardian of the kings during their minority. The empire of Alexander soon broke up, and his dominions were divided amongst his generals. See GREECE, PTOLEMY, SELEUCIDÆ.

Alexander was more than a conqueror. He diffused the language and civilisation of Greece wherever victory led him, and planted Greek kingdoms in Asia, which continued to exist for some centuries. At the very time of his death, he was engaged in devising plans for the drainage of the unhealthy marshes around Babylon, and a better irrigation of the extensive plains. It is even

supposed that the fever which he caught there, rather than his famous drinking-bout, was the real cause of his death. To Alexander, the ancient world owed a vast increase of its knowledge in geography, natural history, &c. He taught Europeans the road to India, and gave them the first glimpses of that magnificence and splendour which has dazzled and captivated their imagination for more than two thousand years. See Freeman's *Historical Essays* (2d series, 1873), and Mahaffy's *Alexander's Empire* (1887).

The wonderful element in the campaigns of Alexander, and his tragical death at the height of his power, threw a rare romantic interest around his figure. It is ever the fate of a great name to be enshrined in fable, and Alexander soon became the hero of romantic story, scarcely more wonderful than the actual, but growing from age to age with the mythopoetic spirit which can work as freely in fact as fiction. The earliest form of the story which we know is the great romance connected with the name of Callisthenes, which, under the influence of the living popular tradition, arose in Egypt about 200 A.D., and was carried through Latin translations to the West, through Armenian and Syriac versions to the East. It became widely popular during the middle ages, and was worked into poetic form by many writers in French and German. Alberich of Besançon wrote in Middle High German an epic on the subject in the first half of the 12th century, which was the basis of the German 'Pfeife' Lauprecht's *Alexanderbuch* (ed. by Hitzel, Halle, 1884), also of the 12th century. The French poets Lambert li Court and Alexandre de Bernay composed, between 1180 and 1190, a romance of Alexander, the twelve-syllable metre of which gave rise to the name *Alexandrin*. The German poem of Rudolf of Ems was based on the Latin epic of Walter of Châtillon, about 1200, which became henceforward the prevailing form of the story. In contrast with it is the 13th-century Old English epic of Alexander (in vol. I. of Weber's *Metrical Romances*, 1810), based on the Callisthenes version. The story appears also in the East, worked up in conjunction with myths of other nationalities, especially the Persian. It appears in Firdusi, and, among later writers, in Nizami. From the Persians both the substance of the story and its form in poetical treatment have extended to Turks and other Mohammedans, who have interpreted Alexander as the *Usulkarnain* ('two horned') of the Koran, and to the Hindus, which last had preserved no independent traditions of Alexander. See Spiegel, *Der Alexanderstypus bei den Orientalen* (Leip. 1851), and Paul Meyer, *Alexandre le Grand dans la Littérature Française au Moyen-âge* (2 vols. 1886).

Alexander I., king of Scotland, the fourth son of Malcolm Canmore, was born about 1078, and in 1107 succeeded his brother, Edgar, only however to that part of the kingdom north of the Firths of Forth and Clyde (see DAVID I.). He married Sibylla, a natural daughter of Henry I. of England, and his reign was comparatively untroubled, though about 1115 he had to quell an insurrection of the northern clans. He founded the abbeys of Seone and Incheolm, and initiated a diocesan episcopate; whilst his determined resistance to the claims of York and Canterbury to supremacy over the see of St Andrews, did much to secure the independence, not only of the Scottish Church, but of Scotland itself. He died at Stirling in 1124.

Alexander II., born at Haddington in 1198, succeeded his father, William the Lion, in 1214. He early displayed that wisdom and strength of character, in virtue of which he holds so high a

place in history among Scottish kings. The first act of his reign was to enter into a league with the English barons who had combined to resist the tyranny of King John. This drew down upon him and his kingdom the papal excommunication; but two years later, the ban was removed, and the liberties of the Scottish Church were even confirmed. On the accession of Henry III. to the English throne, Alexander brought the feuds of the two nations to a temporary close by a treaty of peace (1217), in accordance with which he married Henry's eldest sister, the Princess Joan (1221). The alliance thus established was broken after the death, without issue, of Queen Joan (1238), and the second marriage of Alexander with the daughter of a noble of France. In 1244 Henry marched against Scotland, to compel Alexander's homage. In this emergency, the Scottish king received the steady support of the barons, whose ordinary policy was opposition to the crown, and, according to Matthew Paris, he found himself, in a short time, at the head of 100,000 foot and 10,000 horse. A peace was concluded without an appeal to arms. In 1249, while engaged in an expedition to wrest the Hebrides from Norway, Alexander died of fever at Kerrera, a small island opposite Oban. During his reign, Argyll and Galloway were brought into subjection to the crown.

Alexander III., born in 1241, succeeded his father, Alexander II., at the age of eight, and two years later married the Princess Margaret, eldest daughter of Henry III. of England (1251). His tender age enabled Henry to prosecute successfully for a time his schemes for obtaining entire control over Scotland; but long before he reached manhood, Alexander displayed so much energy and wisdom as to give assurance that when the administration of affairs should come into his hands, it would be vain to think of reducing him to submission. Very shortly after he had come of age, his energies were summoned to the defence of his kingdom against the formidable invasion of Hacon, king of Norway (1263), who claimed the sovereignty of the Western Isles. In attempting a landing at Largs, on the coast of Ayr, the Norwegian prince sustained a total defeat; and Alexander, as the result of this important victory, secured the allegiance both of the Hebrides and of the Isle of Man. The alliance between Scotland and Norway was strengthened in 1282 by the marriage of Alexander's only daughter, Margaret, to Eric, king of Norway. This princess died in the following year, leaving an infant daughter, Margaret, commonly designated the Maid of Norway, whose untimely death, on her way to take possession of her throne, was the occasion of so many calamities to Scotland. During the concluding years of Alexander's reign, the kingdom enjoyed a peace and prosperity which it did not taste again for many generations. The justice, liberality, and wisdom of the king endeared his memory to his subjects, while the misfortunes that followed his death, heightened the national sense of his loss. His only surviving son, who had married the daughter of Guy, Count of Flanders, died without issue in 1284; and in the next year, Alexander contracted a second marriage with Jolota, daughter of the Count de Dreux. The hopes of the nation were soon after clouded by his untimely death. Rising one dark night between Burntisland and Kinghorn, he fell with his horse, and was killed on the spot, 12th March 1286. A monument (1887) near the scene of his death.

Alexander I., Emperor and Autocrat of All the Russias (1801-25), was born in 1777. His father, Paul (q.v.), had no control over his education; it was conducted by his grandmother, the Empress Catharine, with the help chiefly of Lacharpe,

a Swiss; and the young prince was brought up in the most advanced and enlightened opinions of the 18th century. His mother was Maria of Württemberg. In 1793 he married Elizabeth of Baden, and, on the assassination of his father in 1801, succeeded him upon the throne. Alexander knew of the conspiracy to dethrone his father, but he was in no way privy to his murder. The young ruler seemed deeply penetrated with a sense of his obligation to make his people happy and to promote their civilisation and prosperity. Many changes were at once initiated. Education was promoted; the universities of Moscow, Vilna, and Dorpat were remodelled; and new ones were founded at Kazan, Kharkoff, and St Petersburg. Steps were taken for alleviating serfdom. The press-censorship was relaxed; and generally a milder system of law and administration was introduced.

The accession of Alexander was most distinctly felt in the conduct of foreign affairs. In 1801 he concluded a convention putting an end to hostilities with England. He next entered, along with France, into negotiations respecting the indemnification of the minor states in Germany and Italy; but discovering how little Napoleon intended any real compensation, he broke with France, and joined the coalition of 1805. He was present at the battle of Austerlitz, where the allied armies of Austria and Russia were defeated, and retired with the remains of his forces into Russia, declining to enter into the treaty that followed. Next year, he came forward as the ally of Prussia; but after the battles of Eylau and Friedland, in 1807, he was obliged to conclude the peace of Tilsit, in which he managed to prevent the restoration of the kingdom of Poland, and to mitigate the hard fate of the king of Prussia. During the war with France, Alexander had also to carry on hostilities with Persia and with Turkey.

In pursuance of the stipulations of Tilsit, Alexander acceded with his huge empire to the French continental system, thus altering entirely the foreign policy of Russia. He began by declaring war on England in 1808, and, attacking her ally Sweden, wrested from that country the province of Finland. In the war of France against Austria in 1809, Alexander took only a lukewarm part. Against the Porte he renewed the war, which was continued till the peace of Bucharest in 1812.

The unnatural alliance of Alexander with Napoleon could not, however, be maintained. The pressure of the continental system on the material resources of Russia, the despotic changes made by Napoleon, the augmentation of the duchy of Warsaw, the profligate alliance by England and Sweden, awoke in Alexander the thought of a decisive contest against the subjugator of Europe and the disturber of the peace of the world. When this gigantic struggle at last began (1812), Russia brought into the field an army of 300,000 men. During the French invasion, Alexander was not present with his troops, but he took an active part in the great struggles of 1813 and 1814. At the occupation of Paris after the downfall of Napoleon in 1814, Alexander was the central figure of the politics and diplomacy of the time. His courtesy, humanity, and regard for the feelings and interests of the French, won for him a personal regard amounting to enthusiasm. He was received with the same feeling in London, which he visited after the treaty of Paris in June 1814. After a short residence in his own capital, he repaired to the Congress of Vienna. Here he laid claim to Poland as essential to the interests of Russia, but promised to confer on it a constitution. On the return of Napoleon from Elba, Alexander urged the energetic prosecution of the war against the common enemy;

yet on this occasion, too, France owed much to his generosity.

In the end of October 1815, Alexander returned to his own dominions. Under his guidance, Russia had become the leading power on the Continent; the limits of the empire had extended; and notwithstanding the war, the earlier legislative reforms had begun to act favourably on the industry and well-being of the nation. At Paris, Alexander had met Madame Kriidener, who gave a new direction to his mind, and his French ideas gave place to a decided pietism, with sympathies for Protestant and English ways of thinking. The British and Foreign Bible Society established itself at St Petersburg with great success. Alexander received a deputation of Quakers, and prayed and wept with them. The most important political outcome of this period was the Holy Alliance (q.v.), founded by Alexander, and accepted by all the leading Christian countries of Europe, except Britain. Many causes contributed to force Alexander into a reactionary course. He yielded to the influence of Metternich, the celebrated Austrian statesman, and the Holy Alliance became an instrument of political reaction throughout Europe. At home he adopted severe measures of repression, which were in entire contradiction to the principles of his youth.

The progress of the revolt in Greece brought the policy of the emperor into complete opposition to the deepest sympathies of the nation. The Russian people were profoundly interested in the Greek struggle, but the emperor condemned the rising as insurrection. The death of his only and much-loved natural daughter, the terrible inundation suffered by St Petersburg in 1824, in which he exposed himself to personal danger, and the alarm caused by a Russo-Polish conspiracy against all the members of the House of Romanof, contributed not a little to break the heart of the emperor, and completely destroy the composure of his mind. Wary of the burden of governing a vast empire, not yet ripe for the advanced views which he himself cherished, he commenced, in September 1825, a journey to the Crimea for the benefit of his health. He died at Taganrog, December 1, 1825. It is reported that about this time he was heard to repeat: 'And yet men may say of me what they please, I have lived and will die a republican. The rumour that he had been poisoned is altogether groundless. Shortly before his death, he learned the details of the conspiracy which his brother and successor, Nicholas I. (q.v.), had to begin his reign by putting down. See Rambaud, *Histoire de la Russie* (Par. 1879; English trans. by L. B. Lang).

Alexander II., Emperor of Russia (1855-81), was born April 29, 1818. He was carefully educated by his father, Nicholas, who professed himself delighted with the manifestations of 'true Russian spirit' in his son. At sixteen, he was declared of age, made commandant of the Lanciers of the Guard, Hetman of the Cossacks, first aide-de-camp of the emperor, and subjected daily to a life of manœuvring, reviewing, and military parade, which at last seriously injured his health. He then travelled through Germany to recruit his energies, and while there in 1841 concluded a marriage with the Princess Marie (1824-80), daughter of the Grand-duke of Hesse. He now vigorously applied himself to his duties as chancellor of the university of Finland. By his dexterous and winning manners, he found his way to the hearts of the Finns, and weakened their ancient love of independence. On his accession to the throne, March 2, 1855, he found himself in a very critical position. He had two parties to conciliate: the old Muscovite party, zealous for the prosecution of the Crimean war, and the more peaceable portion of the nation, with whom he sympathised.

By temporising he was enabled to conclude a peace. Throughout his reign, he had to hold the balance between Conservatives and extreme Radicals, but succeeded in guiding and promoting reform. The grand achievement of his reign, which was in great measure his own deed, was the emancipation of the serfs—23,000,000 souls—in 1861. Reforms of the tribunals, of civil and criminal procedure, and of municipal institutions followed. In 1865 Alexander established elective representative assemblies in the provinces. He resisted strenuously all foreign interference with Polish affairs during the insurrection of 1863, which was suppressed with great severity. During his reign, the Russian empire was widely extended in two important regions, in the Caucasus and in Central Asia. The capture of Schamyl, the famous Circassian chief, in 1859, closed in favour of Russia her long struggle with the tribes of that country. In 1864 Russia began her decided advance against the khans of Central Asia, and in a few years reduced them all more or less completely to subjection. During the Franco-German war of 1870-71,

Alexander maintained a very sympathetic attitude towards Germany, a policy which was continued and extended in subsequent alliances both with that country and Austria. The marriage of his only daughter Marie with the Duke of Edinburgh in 1871, has had no permanent effect in allaying the mutual jealousies of Russia and England. The Czar shared the national sympathy with the Slav races under Turkish rule, and took the field with the army during the momentous war between Russia and Turkey in 1877-8. But the most remarkable feature of the second half of his reign was the struggle of the Russian autocracy with the revolutionary party, called Nihilists. Like his grandfather, Alexander I., he was personally a liberal and humane monarch, but he could not keep pace with the more forward portion of his subjects; hence the reactionary tendency of many of his later measures. His government repressed the revolutionists most severely, and they sought vengeance by attacking the person of the Czar and his officers. Repeated attempts were made to assassinate Alexander. In 1879 he was shot at in his capital; in the same year, the train in which he was supposed to be travelling was blown up by an elaborate mine beneath the railway; in 1880 a violent and destructive explosion was effected by dynamite below the imperial apartments in the Winter Palace at St Petersburg. On 13th March 1881, he was so severely injured by a bomb thrown at him near his palace, that he died a few hours after. See Lafonté, *Alexandre II.* (1882).

Alexander III., son of Alexander II., was born 10th March 1845, and married the daughter of the king of Denmark in 1866. After his father's death, through fear of assassination he shut himself up in his palace at Gatchina. His coronation was postponed till 1883, and was celebrated with extraordinary magnificence, and with rational festivities lasting several days. During the reign of this emperor, Russia has steadily pursued her policy of conquest, and of the consolidation of her dominions. Through the fall of Merv, the subjugation of the Turkomans in Central Asia was completed. In 1885 hostilities with Britain, with regard to the defining of the frontier between the Russian territories and Afghanistan, for a time seemed imminent (see AFGHANISTAN, RUSSIA). As regards European affairs, his policy on the whole resembles that of his father; a triple alliance between Russia, Germany, and Austria has been regarded as a guarantee of common action; but the growing rivalry with Austria for influence in the Balkan Peninsula, and especially in Bulgaria,

has been a continual occasion of strife. In 1887 there were repeated attempts by the revolutionary party on the life of the emperor.

Alexander VI., the most celebrated of the eight Popes (q.v.) of this name, but at the same time the most infamous of all that ever occupied St Peter's chair. His most conspicuous qualities were a cunning and insidious cruelty, united with great fearlessness in danger, an unwearied perseverance and vigilance in all his undertakings, a soft and plausible manner towards his inferiors, a harsh and grasping spirit towards the rich. In spite of his talents and his love of art and science, he disclaimed, throughout his dissolute career, no means of gratifying his lust—not even perjury, murder, poisoning. He was born in Spain, at Jativa in Valencia, 1431. His real name was Rodrigo Lançol or Lenzuoli, but he assumed the ancient and famous one of his mother's family, Borgia. The beautiful Rosa Vanozza de Cattanei bore him five children, two of whom, Caesar and Lucretia, equalled himself in notoriety (see BORGIA). In 1455 he was made a cardinal by his uncle, Calixtus III., and in 1492, on the death of Innocent VIII., was elevated to the papal chair, which he had previously secured by flagrant bribery. The long absence of the popes from Italy had weakened their authority and curtailed their revenues. To compensate for this loss, Alexander endeavoured to break the power of the Italian princes, and to appropriate their possessions for the benefit of his own family. He employed the most execrable means to gain this end. He died in 1503, most likely of fever, but according to popular tradition, through having accidentally partaken of poisoned wine, intended for ten cardinals, his guests. He apportioned the New World between Spain and Portugal; whilst under his pontificate the censorship of books was introduced, and Savonarola, the earnest and eloquent Florentine priest, who had advocated his deposition, was condemned to be burnt as a heretic. The researches of Von Reumont and Gregorovius have cleared his memory from some at least of the most odious charges; and there can be no question that many of the crimes ascribed to him were the direct or indirect work of Cesar Borgia. See Crichton's *History of the Popes*, vols. ii. and iii. (1887).

Alexander of BATTENBERG, Prince of Bulgaria. See BULGARIA.

Alexander OF HALES, the 'Irrefragable Doctor,' was originally an ecclesiastic in Gloucestershire, but having repaired to the schools of Paris, and become a noted professor of philosophy and theology, he suddenly, in 1222, entered the order of the Franciscans. He continued to lecture, however, till seven years before his death, in 1245. His chief and only authentic work is the ponderous *Summa Universa Theologia* (best ed., Venice, 1576, 4 vols.), written at the command of Pope Innocent IV., and enjoined by his successor, Alexander IV., to be used by all professors and students of theology in Christendom. Alexander gave the doctrines of the church a more rigorously syllogistic form than they had previously had, and may thus be considered as the author of the scholastic theology. Instead of appealing to tradition and authority, he deals with great subtlety, from assumed premises, the most startling doctrines of Catholicism, especially in favour of the prerogatives of the papacy. He refused toleration to heretics, and would have them deprived of all property; he absolves subjects from all obligation to obey a prince that is not obedient to the church. The spiritual power, which blesses and consecrates kings, is, by that very fact, above all

temporal powers, to say nothing of the essential dignity of its nature. It has the right to appoint and to judge these powers, while the pope has no judge but God. In ecclesiastical affairs, also, he maintains the pope's authority to be full, absolute, and superior to all laws and customs.

Alexander, ARCHIBALD, an American divine of Scottish descent, was born in Virginia, 17th April 1772, and died at Princeton, New Jersey, 22d October 1851. He studied theology, and performed itinerant missionary work in various parts of Virginia; became president of Hampden Sidney College in 1796, and pastor of a Presbyterian church in Philadelphia in 1807. On the establishment of Princeton College, he was appointed its first theological professor in 1812, which position he held till his death. Amongst other works, he published *Outlines of the Evidences of Christianity*; *Treatise on the Canon of the Scriptures* (1826); *History of the Patriarchs* (1833); and *History of the Israelitish Nation* (1852); his *Moral Science* was posthumous. His eldest son, JAMES WADDELL ALEXANDER (1804-59), was a Presbyterian minister in Virginia, New Jersey, and at New York; and afterwards professor in Princeton Theological Seminary. He contributed to the *Princeton Review*, wrote over thirty children's books, a life of his father, and miscellaneous works. See his *Life* by Dr Hall (1860). JOSEPH ADDISON ALEXANDER, third son (1809-60), graduated at Princeton in 1826, lectured there on Biblical Criticism and Ecclesiastical History, and for the last eight years of his life filled the chair of Biblical and Ecclesiastical History. He was engaged at the time of his death, along with Dr Hodge, on a commentary of the New Testament. He is best known by his commentaries and *Prophecies of Isaiah* (1846 7; revised edition, 1864), and the *Psalms Translated of Esph.* (3 vols, 1850), both of which have had a large circulation, and have been reprinted in England.

Alexander, WILLIAM LINDSAY, D.D., LL.D., an eminent scholar and divine of the Scottish Congregational Church, was born at Leith, 24th August 1808, and died at Pinkieburn, near Edinburgh, 20th December 1881. He studied at Edinburgh, St Andrews, and Glasgow. He became classical tutor and afterwards president of Blackburn Theological Seminary (1828-31), and in 1832, minister of a chapel in Liverpool. In 1835 he removed to Edinburgh, where as a preacher of no ordinary power he laboured for forty-two years. He was a member of the Bible Revision Committee, and principal of the Theological Hall in connection with the Congregational Church in Scotland. He published many volumes of sermons, pamphlets, lectures, and addresses; was editor of the *Congregational Magazine*; and edited a new issue of Kitto's *Cyclopædia of Biblical Literature* (1870). See his *Life* by Ross (1887).

Alexander Nevski, a Russian hero and saint, born in 1218, was the son of the Grand-duke Jaroslav, of Novgorod, who was forced to submit to the Mongol dominion in 1238. Alexander received the surname of Nevski on account of the splendid victory over the Swedes, which he achieved in 1240, on the Neva, near where St Peter-burg now stands. At the death of his father in 1247, he became his successor, and opposed a papal attempt to reunite the Greek and Roman churches. To the end of his life he remained a vassal of the Tartars or Mongols, but knew how to moderate their tyranny. He was a good prince; and when he died in 1263, the gratitude of the nation canonised him. Peter the Great honoured his memory by building a magnificent convent on the spot where Alexander had fought his great

battle, and by founding the knightly order of Alexander Nevski.

Alexander Severus, a Roman emperor, born in 205 A.D., was the cousin and adopted son of Heliogabalus, whom he succeeded in 222. The excellent education which he received from his mother, Julia Mamaea, rendered him one of the best princes in an age when virtue in a monarch was reckoned more dangerous than vice. He sought the society of the learned; Paulus and Ulpianus were his counsellors; Plato and Cicero were, next to Horace and Virgil, his favourite authors. Although a pagan, he revered the doctrines of Christianity, and often quoted that saying: 'Whosoever ye would that men should do to you, do ye even so to them.' Beloved as he was by the citizens on account of his equity, he soon became an object of hatred to the miliary pretorian guards. His first expedition (231-33), against Artaxerxes, king of Persia, was happily terminated by a speedy overthrow of the enemy. But during one which he undertook in 234 against the Germans on the Rhine, to defend the frontiers of the empire from their incursions, an insurrection broke out among his troops, headed by Maximinus, in which Alexander was murdered, along with his mother, not far from Mainz (235).

Alexanders (*Sisyrinchium alabastrum*), a biennial plant of the natural order Umbelliferae (q.v.), found in waste ground, near ruins, &c. in Britain and the south of Europe. The plant has an aromatic taste, strong and pungent, but becomes rather pleasant when blanched, and was formerly much cultivated and used in the same way as celery, although at present it is little regarded. The frequency of its occurrence near ruins in Britain may probably be referred to its former cultivation. The fruit is carminative. *S. perfoliatum*, a native of Italy, is used in the same way. Another umbelliferous genus (*Zizia*) is popularly called Gold in Alexanders in North America.

Alexandra. See ALBERT EDWARD.

Alexandra Park, a place of public recreation for northern London, 6 miles N. of Charing Cross. It was opened in 1863, and its present 'palace' dates from 1873, its predecessor having been burnt two years before.

Alexandretta. See SCANDEROON.

Alexandri, or ALEXANDRI VASILIO, Roumanian poet and patriot, was born at Jassy in 1821. Educated at Paris, he returned to Jassy in 1839, and attached himself to a party of young men, who, influenced by Western ideas, were at once ambitious of literary distinction, and zealous for political equality and for Roumanian nationality. His share in the abortive revolution of 1848 obliged him for a time to take refuge in Paris, but he then and always laboured incessantly through the press and otherwise for Roumanian independence and unity. He was foreign minister under Ghika in 1859-60. His first volume of verse appeared in 1852; his complete works fill 7 vols. (1873-6); his theatrical pieces, 3 vols. (1875).

Alexandria was founded by Alexander the Great in the autumn of the year 332 B.C. It was situated originally on the low tract of land which separates the lake Mareotis from the Mediterranean, about 14 miles west of the Canopic mouth of the Nile. Before the city, in the Mediterranean, lay an island, upon the N.E. point of which stood the famous lighthouse, the Pharos, built in the time of Ptolemy I. in the 3d century B.C., and said to have been 400 feet high. The island was connected with the mainland by a mole, called the Heptastadium, thus forming the two harbours. The plan of Alexandria was designed by the archi-

tect Deinocrates, and its original extent is said to have been about 4 miles in length, with a circumference of 15 miles. It was intersected by two straight main streets, crossing each other at right angles in a large square, and adorned with handsome houses, temples, and public buildings. The most magnificent quarter of the city was that called the Brucheon, which ran from the centre to the eastern harbour. This quarter of the city contained the palaces of the Ptolemies, the Museum, for centuries the focus of the intellectual life of the world, and the famous library; the mausoleum of Alexander the Great and of the Ptolemies, the temple of Poseidon, and the great theatre. To the south was the beautiful gymnasium. The Serapeum, or temple of Serapis, stood in the western division of the city, which formed the Egyptian quarter, and was called Ilharotis; a small town of that name had occupied the site before the foundation of Alexandria. To the west of the city lay the great Necropolis, and to the east the race course and suburb of Nicopolis. Much of the space under the houses was occupied by vaulted subterranean cisterns, which were capable of containing a sufficient quantity of water to supply the whole population of the city for a year. From the time of its foundation, Alexandria was the Greek capital of Egypt. Its population in the time of its prosperity, is said by Diodorus to have amounted to about 300,000 free citizens, and probably a larger number of slaves. This population consisted mostly of Greeks, Jews, and Egyptians, together with settlers from all nations of the known world. After the death of Alexander the Great, Alexandria became the residence of the Ptolemies. They made it, next to Rome and Antioch, the most magnificent city of antiquity, as well as the chief seat of Greek learning and literature, which spread hence over the greater part of the ancient world. The situation of the city, at the point of junction between the East and West, rendered it the centre of the commerce of the world, and raised it to the highest degree of prosperity.

Alexandria had reached its greatest splendour when, on the death of Cleopatra, the last of the Ptolemies, in 30 B.C. it came into the possession of the Romans. Its glory was long unaltered, and it was the emporium of the world's commerce, especially for corn. In the reign of Caracalla, however, it suffered severely; and the rise of Constantinople promoted the decay of Alexandria. Christianity was introduced, according to tradition, by St Mark. In the 2d century its adherents were very numerous; amongst its teachers were Clemens Alexandrinus and Origen. The strife between Christianity and heathenism powerfully described in Kingsley's *Hyppatia*—gave rise to bloody contests in Alexandria. The Serapeum, the last seat of heathen theology and learning, was stormed by the Christians in 389 A.D., and converted into a Christian church. Alexandria was a chief seat of Christian theology till it was taken by the Arabs, under Amr, in 641, at which time it was much injured. The choice of Cairo as capital of the Egyptian califs hastened the now rapid decay of the city; the discovery of America, and of the passage to India by the Cape of Good Hope, very much diminished its trade; and when, in 1517, the Turks took the place, the remains of its former splendour wholly vanished, walls and buildings being reduced to ruins. In 1778 Alexandria contained no more than 6000 inhabitants. Under Mehmet Ali, however, the tide turned, and the city recovered rapidly. It is now again one of the most important commercial places on the Mediterranean. The Suez Canal diverted part of its trade as the centre of steam communication with India; but this was more

than compensated by the general impetus given by the canal to Egyptian prosperity. In 1882, during the rising of Arabi Pasha, serious damage was done to the city. The Europeans were maltreated; and as Arabi would not desist from strengthening the fortifications, an English fleet, in the interests of the khedive, bombarded the forts of Alexandria for over ten hours, July 11. On the two following days the town was sacked and plundered by the soldiery and populace, and great part of it destroyed by fire. A British force occupied it on the 14th.

The present city (called *Skanderich* by the Arabs) is not situated exactly on the site of the old one, but is chiefly built on the mole, which has been increased by alluvial deposits till it has become a broad neck of land between the two harbours. The city is a strange mixture of East and West, old and new, not gracefully harmonised. The native town, unpaved and in wet weather hardly passable, contains poor houses and wretched huts. The ever-increasing Frankish quarters have quite a European appearance, and swarm with cafés, shops, theatres, and the like, lighted with gas. The castle stands near the old Pharos, and the handsome new lighthouse has a revolving light, visible at a distance of 20 miles. Recent improvements, undertaken at a cost of £2,000,000, are expected to make the old harbour the western one—one of the best and most spacious on the Mediterranean. There is railway communication with Cairo and Suez; the Mahmoudieh Canal, made by Mehemet Ali, connects Alexandria with the Nile. The recent growth of the city has been extraordinary. Pop. (1825) 16,000; (1840) 60,000; (1882) 227,064, of whom 18,672 were foreigners, many Greeks, Italians, and French. The value of exports (cotton, cotton seed, lentils, oilseed, hemp, drugs) varied in 1875-85 from £10,000,000 to £14,000,000 (two-thirds going to Britain); of imports, from £5,000,000 to £7,000,000 (half from Britain). Of the few remaining objects of antiquity the most prominent is Pompey's Pillar (q.v.), as it is erroneously called. Of the so-called *Cleopatra's Needles*—two obelisks of the 16th century B.C. which long stood here—one was brought to England and erected on the Thames Embankment, 1878; and the other, presented by the khedive to the United States, was set up at New York in 1881. The climate of Alexandria does not correspond with what is true of Egypt generally. In winter it rains almost daily; in summer the heat is moderated by sea breezes.

ALEXANDRIAN CODEX, an important manuscript of the sacred Scriptures in Greek, now in the British Museum. It is written on parchment, in finely formed uncial letters, and is without accents, marks of aspiration, or spaces between the words. Its probable date is the middle of the 5th century. With the exception of a few gaps, it contains the whole Bible in Greek (the Old Testament being in the translation of the Septuagint), along with the epistles of Clement Romanus, of whose genuine epistle to the Corinthians it is the only manuscript extant. For purposes of biblical criticism, the text of the Epistles of the New Testament is the most valuable part. This celebrated manuscript belonged, as early as 1098 to the library of the patriarch of Alexandria. In 1628 it was sent as a present to Charles I. of England by Cyrillus Lucaris, patriarch of Constantinople, who declared that he had got it from Alexandria, where he had held the same office; and that it was written there appears from internal and external evidence. Facsimiles have been published, of the New Testament, by Woide (Lond. 1786), and by Cowper (Lond. 1800); of the Old Testament, by Eber (Lond. 1816-28).

ALEXANDRIAN LIBRARY.—This remarkable collection of books, the largest of the ancient world, was founded by the first Ptolemy, and fostered by his son. It quickly grew, and already in the time of the first Ptolemy, Demetrius Phalerens had 50,000 volumes or rolls under his care. During its most flourishing period, under the direction of Zenodotus, Aristarchus of Byzantium, Callimachus, Apollonius Rhodius, and others, it is said to have contained 490,000, or, according to another authority, including all duplicates, as many as 700,000 volumes. The greater part of this Library, which embraced the collected literature of Rome, Greece, India, and Egypt, was contained in the famous Museum, in the quarter of Alexandria called the Brucheion. During the siege of Alexandria by Julius Caesar, this part of the Library was destroyed by fire; but it was afterwards replaced by the collection of Pergamos, which was presented to Cleopatra by Mark Antony. The other part of the Library was kept in the Serapeum, the temple of Jupiter Serapis, where it remained till the time of Theodosius the Great. When this emperor permitted all the heathen temples in the Roman empire to be destroyed, the magnificent temple of Jupiter Serapis was not spared. A mob of fanatic Christians, led on by the Archbishop Theophilus, stormed and destroyed the temple, together, it is most likely, with the greater part of its literary treasures, in 391 A.D. It was at this time that the destruction of the Library was begun, and not at the taking of Alexandria by the Arabs, under the Calif Omar, in 641, when its destruction was merely completed. A ridiculously exaggerated, although ancient story, tells that the Arabs found a sufficient number of books remaining to heat the baths of the city for six months. The historian Orosius, who visited the place after the destruction of the temple by the Christians, relates that he then saw only the empty shelves of the Library. See Ritschl, *Die Alexandrinischen Bibliotheken*, in *Opuscula* (1866), and Weniger, *Das Alexandrinische Museum* (1875).

ALEXANDRIAN SCHOOL. -- After liberty and intellectual cultivation had declined in Greece, Alexandria in Egypt became the home and centre of science and literature. The time in which it held this position may be divided into two periods; the first including the reigns of the Ptolemies, from 323 to 30 B.C.; the second, from 30 B.C. to 640 A.D. or from the fall of the Ptolemaic dynasty to the irruption of the Arabs. During the first period the intellectual activity at Alexandria was mainly of a purely literary or scientific kind; but during the second, partly from Jewish and Christian influences, it developed into the speculative philosophy of the Neo-Platonists and the religious philosophy of the Gnostics.

Ptolemy Soter, the first ruler who introduced and patronised Greek science and literature in Alexandria, was followed by that yet more munificent patron, Ptolemaeus Philadelphus, who regularly established the celebrated Alexandrian Library and Museum, which had been begun by his father. This Museum was somewhat like a modern university, and within its walls learned scholars lived and taught. The loss of Greek freedom soon took from Greek thought much of its boldness and originality, but thinkers found substitutes for these in learned research and criticism. They studied grammar, prosody, mythology, astronomy, and medicine, and unfolded their information in long didactic poems in epic form, full of learning, and marked by perfect mastery of verse, but often dull to a degree, and marred by numerous obscure and recondite allusions. Examples of these are the *Argonautica* of Apollonius Rhodius, and the

Alexandra or *Cassandra* of Lycophron. Other writers of epics were Euphorion, Nicander of Colophon, Dionysius, Dicaearchus, Rhianus, and Oppianus. Many poets employed lyric and elegiac forms for subjects completely unsuited for poetic treatment, which are yet happily expressed in verse. The earliest of the elegiac poets was Philletas of Cos; the greatest, perhaps, Callimachus. Among the lyric poets were Phanocles, Hermesianax, Alexander of Ætolia, and Lycophron. Epigrams and dramas were also written; but of the latter scarce anything has survived beyond the names of the seven tragedians called the Alexandrian Pleiades. Out of the Amœbean verse or bucolic mime—a rudimentary kind of drama—grew the best product of Alexandrian poetry, the *Idylls* of Theocritus. Still more active than the poets were the grammarians, to whom it is mainly due that we now possess the masterpieces of Greek literature at all. They were both philologists and *littérateurs*, who explained things as well as words, and were thus a kind of encyclopædists. Among these the greatest were Zenodotus of Ephesus, Aristophanes of Byzantium, and Aristarchus of Samothrace; only less eminent critics were Alexander of Ætolia, Lycophron, Callimachus, and Eratosthenes. Their chief service consists in having collected the writings then existing, prepared corrected texts, and preserved them for future generations.

The Alexandrian school has a spirit and character altogether different from the previous intellectual life of Greece. From the attention paid to the study of language, it was natural that correctness, purity, and elegance of expression should be especially cultivated; and in these respects many of its writers are distinguished. But what no study and no effort could give—the spirit that animated the earlier Greek poetry—was in most of these works wanting. In place of it, there was displayed greater art in composition; what had formerly been done by genius, was now to be done by the rules furnished by criticism. Where imitation and rule thus took the place of inspiration, each generation of disciples became more artificial and lifeless than their masters, until ultimately criticism degenerated into frivolous fault-finding, and both prose and poetry became laborious affectation. Still, for about four centuries, the Alexandrian school was the centre of learning and science in the ancient world. Counting from its origin to its complete extinction, it lasted a thousand years. The influence of the Alexandrian school upon Latin literature in the Augustan age must not be forgotten. We find it in all the contemporary poets, notably in Virgil, the greatest poet of the group.

THE ALEXANDRIAN PHILOSOPHY is characterised by a blending of the philosophies of the East and of the West, and by a general tendency to *eclecticism*, as it is called, or an endeavour to reconcile conflicting systems of speculation, by bringing together what seemed true in each. The most famous representatives of this school were the Neo-Platonists (q.v.). Uniting the religious notions of the East with Greek dialectics, they represent the struggle of ancient civilisation with Christianity; and thus their system was not without influence on the form that Christian dogmas took in Egypt. The amalgamation of Eastern ideas with Christian gave rise to the system of the Gnostics (q.v.), which was elaborated chiefly in Alexandria. See Bigg's *Christian Platonists of Alexandria* (Bampton Lectures, 1886); and the articles PHILO JUDEUS, CLEMENS ALEXANDRINUS, ORIGEN.—The Alexandrian school was no less distinguished for the culture of the mathematical and physical sciences, which here reached a greater height than anywhere else in

ancient times. Its mathematical school was founded in the reign of the first Ptolemy by the famous Euclid. Among its chief ornaments were Eratosthenes, who wrote well on almost all branches of human knowledge. His works on chronology are still valuable, and he was the first to attempt the measurement of the earth. Another was Apollonius of Perga, 'the great geometer,' author of a work on conic sections. The astronomers were distinguished from all their predecessors by their setting aside all metaphysical speculation, and devoting themselves to strict observation. Perhaps the greatest was Hipparchus, the true father of astronomy, to whom Claudius Ptolemy owed the substance of his famous work, the *Almagest*.

Alexandria, a town of Dumfriesshire, on the west bank of the Leven, opposite Bonhill, 3 miles N. of Dumfries. It has grown from a mere 'clachan' to a thriving town, such growth being due to the neighbouring cotton-printing, bleaching, and Turkey-red dye-works, established since 1768. Pop. (1841) 3039; (1881) 6173.

Alexandria, a port of entry on the right or Virginian bank of the Potomac, U.S., 7 miles below Washington, on the opposite side of the river, with which it is connected by rail. Though Alexandria is fully 100 miles from the entrance of the Potomac into Chesapeake Bay, yet the stream in front of it, which forms its harbour, is still a mile wide. The place is accessible from the sea to the largest vessels, and has ample railway accommodation; the Chesapeake and Ohio canal begins here. The trade of the city has steadily increased, while cotton manufactures also have been introduced on an extensive scale. Pop. (1870) 13,570; (1880) 13,658.

Alexandrines are rhyming verses consisting each of twelve syllables or six measures. The name is most probably derived from an old French poem on Alexander the Great, composed between 1180 and 1190, in which this measure was first used; according to others, it was so called from the name of one of its authors, Alexander de Bernay. The Alexandrine has become the regular epic or heroic verse of the French, among whom each line is divided in the middle into two hemistichs, the sixth syllable always ending a word. In English, this rule is not always observed, as in the following verse:

That all the woods shall an | swer, and their echoes ring.

The only considerable English poem wholly written in Alexandrines is Drayton's *Polyolbion*; but the Spenserian stanza regularly ends in an Alexandrine, and the measure occurs occasionally in our common heroic verse of five feet, as the last line of a couplet:

When both are full, they feed our best abode,

Like those that water'd once | the paradise of God.—DRAYTON.
Pope's lines in the *Essay on Criticism* are familiar:

A needless Alexandrine ends the song,

That, like a wounded snake, drags its slow length along.

In spite of this, Pope introduced Alexandrines at the close of his *Messiah* and elsewhere, though his later poems contain very few examples. According to Dr Johnson, 'Cowley was the first poet that mingled Alexandrines at pleasure with the common heroic of ten syllables; and from him Dryden borrowed the practice, whether ornamental or licentious.'

Alexandropol (formerly *Gouari*), an important fortress and the largest town in the Erivan district of Russian Armenia. It lies on a treeless plateau on the road from Erivan to Kars, and has accommodation for a garrison of 10,000 men. The stronghold gives the Russians complete command of the head-waters of the Euphrates. The silk trade is actively carried on in the town. Pop. (1880) 20,477.

Alexandrov, a town in the Russian government of Vladimir, 58 miles N.E. of Moscow. There are dyeworks, and ironware and muskets are manufactured. Pop. (1880) 6200.

Alexandrovsk, a small Russian town in the government of Ekaterinoslav, Russia, on the left bank of the Dnieper, 202 miles N. of Simferopol by rail. Pop. (1880) 5965. Also, a Russian settlement in East Siberia, founded in 1815, opposite the island of Sakhalin, with a good harbour.

Alexei, or ALEXIS, called MICHAÏLOVITCH, the second Russian czar of the House of Romanoff, was born in 1629, and succeeded his father, Michael, in 1645. An insurrection disturbed his reign in 1648, and popular discontent favoured the plans of two pretenders to the throne. In his two campaigns against the Poles (1654-67), he took Smolensk, conquered and devastated almost the whole of Lithuania, and secured for himself the possession of several provinces. He also gained a part of the Ukraine; but his war with Sweden (1656-58) was unfortunate. Alexei introduced various important reforms into the Russian laws; and ventured on some ecclesiastical changes, which produced serious dissensions. He died in 1676. By his second wife he was the father of Peter the Great.

Alexei, called PETROVITCH, the eldest son of Peter the Great of Russia, was born at Moscow in 1690. Having shown himself opposed to the reforms and innovations made by the emperor, he was excluded by Peter from the line of succession to the throne. With this decision he appeared to be satisfied, and declared his intention of spending the remainder of his days in a monastery; but escaped to Vienna, and thence went to Naples. He was induced to return to Russia, and soon after, the accomplices of his flight were punished with merciless severity. Alexei was condemned to death, but received a pardon; yet the agitation of the trial so affected his health, that he died in prison a few days after (1718). Other accounts assert that he was beheaded in prison. Alexei left a son, who, as Peter II., was elevated to the throne.

Alexinatz, a town of Servia, on the Moravitz, 134 miles SSE. of Belgrade by rail. In 1876 it suffered severely on its capture by the Turks; and near it is a memorial (1880) to the Russians who fell there. Much tobacco is raised in the neighbourhood. Pop. (1884) 5108.

Alexius Comnenus, one of the ablest rulers of the Byzantine empire, was born at Constantinople in 1018. He was the nephew of the Emperor Isaac Comnenus, on whose abdication, in 1059, his own father refused the purple; and Alexius, having in youth given brilliant promise of military genius, was at length, in 1081, after four brief anarchy reigns, elevated by his soldiers to the throne. Gibbon graphically paints his position and achievements. 'Everywhere he was encompassed with foes. The Scythians and Turks were pouring down from the north and north-east; the fierce Normans, who had effected a lodgment in Sicily and Italy, were menacing his western provinces; and, in 1096, a myriad of warriors of the first crusade burst into his empire on their way to Palestine, and encamped around the gates of his capital. Yet he contrived to avoid all perils by the wisdom of his policy, the mingled patience and promptness of his character, his discipline in the camp, and his humanity on the throne. He reigned for thirty-seven years; and had it been possible to preserve the weak and corrupt Byzantine empire in its integrity, a ruler like Alexius might have achieved the task. He could only delay the inevitable doom. Historians differ as to the sincerity of his conduct towards the crusaders. His daughter Anna Comnena, who wrote his life, defends his 'policy' with

filial piety; but it seems clear that he entertained a profound dread and suspicion of the half-civilised Franks, and, knowing the weakness of his own empire, was compelled to dissimulate. He died in 1118.

Alfa, one of the varieties of Esparto (q.v.) valuable for paper-making.

Alfarabi, an Eastern philosopher, born at Farab, across the Oxus. After studying at Bagdad, he travelled widely, and, on finally settling at Damascus, he was received with honour by the calif, who assigned him a pension, which he enjoyed till his death in 950. He led a life retired and temperate, almost ascetic. The subjects of his voluminous writings embrace almost every known science; but he is most worthy of remembrance as the first to attempt the compilation of an Encyclopædia, the MS. of which is in the library of the Escorial.

Alfieri, VITTORIO, COUNT, one of the most famous of modern Italian poets, was born at Asti, in Piedmont, on the 17th January 1719. His education was very defective, but at fourteen he found himself master of a vast fortune. The chief interest of his youth was a passionate love for horses, which he retained through life. The years 1767-72 he spent in travelling through the greater part of Europe, after which he returned to Turin, and devoted himself to literary pursuits, renouncing idleness and unworthy amours. The applause which his first attempts received, encouraged him in his determination to win fame as a dramatic author. But as he clearly saw the deficiencies of his education, he began at a mature age to learn Latin, and also to study the Tuscan dialect, for which purpose he went to Tuscany. On his journey thither, Alfieri made the acquaintance of the Countess of Albany, wife of the Pretender, Charles Edward Stuart. He became deeply attached to her, and in this—the one persistent love of his life—he found the impulse that his vacillating nature needed. To render himself worthy of her esteem, he strove with unremitting earnestness after poetic excellence; and in order to be perfectly free and independent of all other cares, he transferred his whole property to his sister, in exchange for an annuity which was hardly half his former income. He now lived alternately in Florence and in Rome. Afterwards, when the Countess was released by the death of her unworthy husband, they lived together in Alsace or in Paris, until the Revolution drove them first to England, and next to Florence. Here Alfieri died, on the 8th October 1803. Their ashes repose in the church of Santa Croce, in Florence, under a beautiful monument by Canova, between the tombs of Michael Angelo and Machiavelli. Alfieri published twenty-one tragedies, six comedies, and one 'tragedy-comedy'—a name invented by himself. These show a want of fresh imaginative vigour, and betray the laborious perseverance with which their author did violence both to himself and to art. He was inspired more by politics than by poetry. He wished to breathe a spirit of freedom into the dormant minds of his countrymen, and considered the theatre as a school in which the people might learn to be 'free, strong, and noble. In order to preserve the purity of his muse, Alfieri had resolved to read no other Italian poet. He wished to produce an effect by the very simplest means, and, renouncing the aid of ornament, to please by manly strength and earnestness alone. His works are on this account cold and stiff, his plots simple even to poverty, his verse hard and unpolished, and his language destitute of that magic splendour of colouring which stirs the inmost soul. In spite of this, Alfieri did good service to

Italian tragedy. He corrected the effeminate taste which had before prevailed, as well as the pedantry of an affected imitation of Attic models. Succeeding writers endeavoured to imitate his strength and simplicity. His comedies are less successful than his tragedies. They manifest the same serious political tendency; the invention is poor, the development of the plot uninteresting, and the characters are only general sketches, without individuality. The most successful of his dramatic works is his 'tragededia' *Abel*, a mixture of tragedy and opera. Besides his dramatic works, he left an epic poem in four cantos, an autobiography, also many lyrical poems, sixteen satires, and poetical translations of Terence, Virgil, and portions of Æschylus, Sophocles, Euripides, and Aristophanes. After his death, appeared his *Misogallo*, a memorial of his hatred to the French. His *Opere* were published at Pisa in 22 vols. (1805-1815). Centofanti published a life in 1842, and Teza in 1861. See also Vernon Lee's *Countess of Albany* (1884).

Alfonso III., surnamed THE GREAT, king of Leon, Asturias, and Galicia, succeeded his father, Ordoño, in 866. After reducing to obedience his jealous and factious nobles, he turned his arms against other enemies, fought through more than thirty campaigns, and gained numerous victories over the Moors, occupied Coimbra, and extended his territory as far as Portugal and Old Castile. But these constant wars entailed great expense and misery on his subjects, and resulted, in 888, in a popular rising, at the head of which was Alfonso's own son Garcias. But the active king quickly crushed the rebels, and threw his son into prison. A second conspiracy, instigated by the queen, was more successful, and Alfonso was obliged to abdicate the throne, and divide his territory among his three sons. But once again the old hero was called upon to save his country, and lead its armies against the invading Moors. After returning in triumph, he died at Zamora, 910.

Alfonso X., surnamed 'the Astronomer,' 'the Philosopher,' or 'the Wise' (*El Sabio*), king of Leon and Castile, born 1226, succeeded his father, Ferdinand III., in 1252. Elected as their king by part of the German princes in 1257, he had to be content with the empty honour, nor was he more successful in his hereditary claim to Swabia through his mother Beatrix, daughter of Philip of Swabia. He was more successful in his wars with the Moors, and his victories over them enabled him to unite Murcia with Castile. In 1271 he was able to crush an insurrection headed by his son Philip; but a second and successful rising, under another son Sancho in 1282, deprived him of his throne. Two years later, he died a fugitive at Seville. Alfonso was the founder of a Castilian national literature. He caused the first general history of Spain to be composed in the Castilian tongue by his historians, as well as a translation of the Old Testament to be made into the vernacular by Toledo Jews. He completed the well-known code of laws, *Leyes de las Partidas*, which in 1501 became the universal law of the land; and he wrote several long poems, besides a work on chemistry, and another on philosophy. He sought to improve the Ptolemaic planetary tables, whose anomalies had struck observers even at that early time. For this purpose, he assembled at Toledo upwards of fifty of the most celebrated astronomers of that age. His improved planetary tables, still known as the *Alfonsoine Tables*, were completed in 1252 at the cost of 40,000 ducats. The *Opusculos Legales* of Alfonso were published by the Royal Academy of Madrid in 1836.

Alfonso I. (*El Conquistador*, 'the Conqueror'), earliest king of Portugal, was the son of Henry of

Burgundy, conqueror and first Count of Portugal. Born in 1110, he was but two years of age at his father's death, so that the management of affairs fell into the hands of his ambitious and dissolute mother, Theresa of Castile. Wresting the power from her in 1128, he turned his sword against Castile and the Moors, and defeated the latter, after a bloody struggle, at Ourique, July 25, 1139, proclaiming himself king of Portugal on the field of battle. The title was confirmed by the pope three years later. After settling the succession, the privileges of the nobility, and the administration of justice at the Cortes of Lamego, with the help of some casual English crusaders he took Lisbon (1147), and later, the whole of Galicia, Estremadura, and Elvas. He died at Coimbra, December 6, 1185.

Alfonso VI., king of Portugal, succeeded his father, John IV., in 1656, when but thirteen years of age. For some years the government was in the hands of his mother, Luise de Guzman, a woman of great wisdom and prudence; but in 1662 the sickly and dissolute prince dismissed his mother from her office, only to fall as completely into the hands of his minister, Count Castel-Melhor. Yet Portugal was victorious in the war against Spain, spite of the incapacity of king and minister, although for this she had to thank her English and French allies. In 1666 Alfonso married a princess of Savoy, but the queen was soon disgusted with her unworthy husband, and conspired with his brother Pedro against him. He was forced to surrender to the latter his crown, and to dissolve on his behalf what was a marriage merely in name. Alfonso died twelve years later (1683), a state prisoner at Cintra.

Alfonso V., king of Aragon and Navarre, but Alfonso I. of Naples and Sicily, 'the Magnanimous,' succeeded his father in 1416, when but 15 years old. Summoned to her help by Queen Joanna II. of Naples, he defeated her foes, Sforza and Louis of Anjou, but lost her favour by throwing into prison her minion Caracciolo. The fickle queen now declared his rival Louis her successor. At her death in 1435, Alfonso resolved to claim the kingdom, but found himself opposed by Duke René of Lorraine, whom Joanna had appointed her successor after the death of Louis. Rome and Genoa sided with René, and the Genoese fleet attacked and defeated that of Alfonso, the monarch himself being taken prisoner. He was sent to Duke Philip of Milan, who, charmed by his manner and talents, soon set him at liberty, and even formed an alliance with him. After a five years' warfare, Alfonso was successful, and entered Naples in triumph, and was recognised as its king by the pope. He patronised letters and the arts, and governed with prudence and justice. He died at Naples in 1458, leaving his hereditary dominions to his brother John, and Naples to his own son Ferdinand, who was legitimated by the pope.

Alford, a village of Aberdeenshire, 30 miles N.W. of Aberdeen. Here Montrose defeated the Covenanters under Baillie, 2d July 1645.

Alford, HENRY, born in London in 1810, in 1829 entered Trinity College, Cambridge, and having taken a good degree, and received orders, in 1834 was elected to a fellowship. His first volume, *Poems and Poetical Fragments* (1831), was followed by his most popular work, *The School of the Heart, and other Poems* (1835), which has been frequently re-issued, especially in America. About the same time he became vicar of Wynneswold, Leicestershire, where he remained till 1853, gradually enlarging the circle of his studies, and obtaining fresh literary distinction. In 1841 he published *Chapters on the Greek Poets*, a work which exhibits both purity of taste and breadth of

scholarship. In 1844 appeared the first volume of his *magnum opus*, the Greek Testament with notes and various readings; the fourth was not published till 1861. In 1853 he removed to Quebec Chapel, London, where he continued to maintain his high reputation as a sound and eloquent preacher, until, in 1857, he was appointed Dean of Canterbury by Lord Palmerston. Among his latest writings was *A Plea for the Queen's English*, which excited considerable discussion. In all, his works comprise 48 volumes and 104 articles, some of the latter contributed to the *Contemporary Review*, of which he was the first editor (1866-70). Several of his hymns are widely popular, as 'Come, ye thankful people, come.' He died January 12, 1871. See the Life by his widow (1873).

Alfred (871-901), king of the West Saxons (Wessex), was born at Wantage, in Berkshire, in 849. His father was Ethelwolf, son of Egbert, king of the West Saxons; and though the youngest of five sons, he succeeded to the crown, in 871, on the death of his brother Ethelred, at the age of 22. By that time the Danes had overrun most of England north of the Thames. The victory of Ashdown, won chiefly by the bravery of Alfred, before his accession to the throne, had given only a temporary check to their incursions into Wessex. In the year of his accession, the West Saxons fought nine battles against the Danes, with varying success. After that, there was respite for some years, till in mid-winter 878, Guthrum, king of the Danes of East Anglia, suddenly burst into Wessex with his savage host. Alfred could make no effectual resistance, and had to seek refuge in the marshes of Somersetshire. There he raised a fort at Athelney, and with a band of faithful followers maintained himself for several months. To this period belongs the well-known story of the burnt cakes. The West Saxons, however, were not subdued. In the same year (878), Alfred gathered his friends around him, and defeated the Danes at Edington, in Wiltshire. By the Peace of Wedmore, Guthrum was obliged to receive baptism, and to acknowledge the supremacy of Alfred, who retained for himself the country south of the Thames, and the greater part of Mercia, while ceding to the Danes East Anglia and the rest of Mercia. The wisdom of the arrangement is seen in the fact that Guthrum, on the whole, continued quiet and faithful to the treaty till his death.

Early in his reign, Alfred saw the necessity of meeting the Danes on their own element, the sea, and his success led him to establish an English navy. In 886 he recovered London, in 893 Northumbria made submission to him; and thus he became nominally king of all England. On the whole, Alfred enjoyed a much-needed period of peace, from the Peace of Wedmore (878) till 893, when a fresh swarm of Danes, under the leadership of Hasting, infested the country. They were supported by their fellow-countrymen in East Anglia and Northumbria, and gave much trouble. At last, in the course of their marching and ravaging, they sailed with their fleet up the Lea, where Alfred brought them to term by diverting the river, and leaving their ships dry. After five years of struggle, peace was re-established.

As a leader, Alfred's great work thus consisted in repelling the invasion of the Danes, who at his accession threatened to subvert the whole country, and in helping towards the consolidation of England into a united monarchy. His work as a legislator is also important, though it is absolutely undervalued to regard him as establishing trial by jury, as having divided England into counties and hundreds, or as the founder of the university of Oxford. As legislator, he simply compiled or collected the best among the enactments of earlier

kings. The aim of all his work was practical, to promote the good of his people; and the writings for which he is celebrated bear the same character of sagacious usefulness.

Alfred died on the 27th of October 901, aged 52, leaving his country in the enjoyment of comparative peace and prosperity, the fruit of that wise and energetic rule which has made his memory dear to all generations of Englishmen, as that of their best and greatest king. We cannot perhaps realise the resolute patience of Alfred in his political and military capacity, for we have but a very imperfect knowledge of the obstacles which stood in his way; but it must excite both our highest wonder and reverence to behold a man pursuing solitarily, in the midst of ferocity, barbarism, and ignorance, and in spite of the perpetual pains with which his body was racked, so many various and noble schemes for the civilisation and true glory of his country. The principal writings of Alfred are his translations of Boethius' *Consolation of Philosophy*, of the Histories of Bede and Orosius, and of the *Pastoral Care* of Gregory the Great (the last edited by Sweet, 1871). The most authentic sources of information on the history of Alfred are the Life by Asser, and the English chronicles for the period. Of more modern books, see the life by Professor Reinhold Pauli (1851, Eng. trans. edited by T. Wright, 1852), and Hughes, *Alfred the Great* (1878).

Alfreton, a market town of Derbyshire, 14 miles NNE. of Derby by rail. It has manufactures of hats, stockings, and brown earthenware. There are collieries and iron works in the vicinity. The town is irregularly built, and contains many very old houses, but has of late rapidly increased. Pop. (1871) 3680; (1881) 4492.

Algae. While the sea-weeds furnish the most familiar representatives of this great series of lower plants, many forms are abundant in fresh water, and even occur on *terra firma*. So great is the diversity of form which they present, that they must by no means be regarded (as was too long the case) as a 'mere natural order,' corresponding to those of higher plants, but rather as a vast and vague alliance comprehending many orders, and presenting all degrees of organisation, from the simple and almost undifferentiated cell, onwards through linear and plane cell-aggregates, to forms of almost arboresecent complexity and often gigantic size. It is impossible, therefore, to indicate any set of common characters corresponding to those presented by higher groups; the real diagnosis must be rather a negative one. Dividing the vegetable kingdom into (a) *Cormophytes*, characterised by the possession of an ascending and descending axis, with appendages, and comprehending the higher cryptogams as well as the phanerogams; and (b) *Thallophytes*, destitute of stem and leaf, the latter are broadly distinguishable as Algae, Fungi, and Lichens. The Lichens (q.v.) being mixed into a curiously interwoven web of mixed algal and fungal nature, the problem of discriminating algae from fungi remains, and this has been the subject of no little research and controversy (see FUNGI). The essential fact, however, is, that in both groups there is exhibited a broadly parallel advance in morphological complexity, from unicellular and filamentous to higher forms, and similarly as respects the reproductive system. These correspondences are, moreover, sometimes so close as to leave little doubt of the origin of the fungal form from the corresponding algal one, by the simple disappearance of its chlorophyll, consequent on the assumption of parasitic or saprophytic life, just as is observed among phanerogams, such as dodder or toothwort. The presence or absence of chlorophyll becomes thus

the only *absolutely* constant distinction between fungi and algae, and this break-down of the morphological barrier led Cohn, and subsequently Sachs and other botanists, to frame classifications in which the fungi and algae were arranged together in a single ascending series, characterised by the degree of differentiation of the reproductive system. A summary of this mode of classification is thus worth noting, not only because it has been extensively employed in botanical manuals, &c., but because emphasising the importance of the degree of development of the reproductive system. (1) Reproduction asexual—PROTOPHYTES. (2) Reproduction by conjugation of similar cells to form a resting 'zygospore'—ZYGOSPOREÆ. (3) Reproductive cells distinctly differentiated as male and female; the fertilised female cell (ovum) giving rise to swarmspores or a new plant—OOSPOREÆ. (4) After fertilisation, a peculiar vegetative growth arises, within which the fertilised ovum may variously develop—CARPOSPOREÆ. The defects of such a classification, both in grouping quite unrelated forms and separating obviously kindred ones, have been now, however, fully pointed out, especially by De Bary; and for the present purpose it will be convenient to waive as far as possible the dogmatic treatment of the problem of classification, and above all things clearly to point out the general lines upon which all classifications are based, and the essential facts which these differ merely in variously accentuating. A series of the most important and accessible of the simpler types of algae must, in the first place, be briefly described.

Our concrete studies may therefore conveniently commence with such a simple and common form as the *Pleurococcus vulgaris*, to which the green

lowest alga, in which multiplication is by transverse division only, may therefore more con-

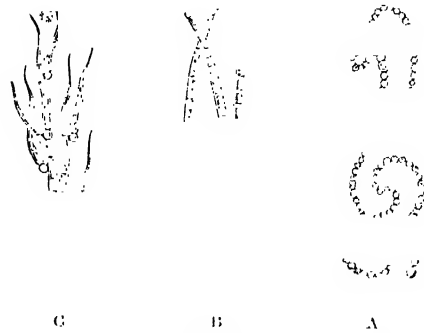


Fig. 2.

A, *Nostoc*; B, *Oscillatoria*; C, *Rivularia*.

veniently be discussed along with their more important congeners, the Bacteria (q.v.).

Returning to our primitive Protophytes like form, we may readily imagine its multiplication by division to continue until not only four, but eight, sixteen, or more segments are formed. Let these segments, held together by a slightly more gelatinous cellulose envelope, pass into the motile phase, the result will be a ciliated sphere, of which the constituent cells may sometimes themselves re-segment before breaking up; more frequently, however, they separate, and may often be observed



Fig. 1.

Fig. 1. Life history of Unicellular Plant (*P.*)

1, encysted; 2, cutting it's wall; 3, ciliated; 4, dividing; 5, resting; 6, dividing.

covering of tree trunks, &c., is largely due. Here the organism is a simple Cell (q.v.), or nucleated mass of protoplasm, tinged green by chlorophyll, and covered by a cellulose wall. Multiplication by transverse division is, however, in active progress: twos and fours are thus formed, but soon separate as independent cells. Closely allied forms occur in water, and may be followed through a more complex life-history. Especially after a period of cold or drought, the remarkable process of 'rejuvenescence' may be observed: the protoplasm escapes through a rupture in the cell-wall, develops a couple of delicate contractile filaments or cilia, and thus enters an actively 'motile state' of existence. After a time the resting phase is resumed, the cilia being withdrawn, and a cell-wall redeveloped.

Some such forms are known in the vegetative state alone, and where simply green, are termed *Palmellaceæ*; they frequently have gelatinous cell-walls. Many closely allied types develop a bluish or yellowish chlorophyll (phycocyan and phycocoumarin of spectroscopists); and are hence united under the common title of *Cyanophyceæ*. Some of these form jelly-like masses (*Gloeocephala*, *Nostoc*), others become filamentous; the constituent cells of the filament remaining similar to each other (*Oscillatoria*), or differentiating a larger cell, or 'heterocyst' of dubious function, generally at one end (*Rivularia*). The chlorophyll, too, may disappear altogether, and then we pass almost insensibly among the *Bacteria* or *Schizomycetes*. These

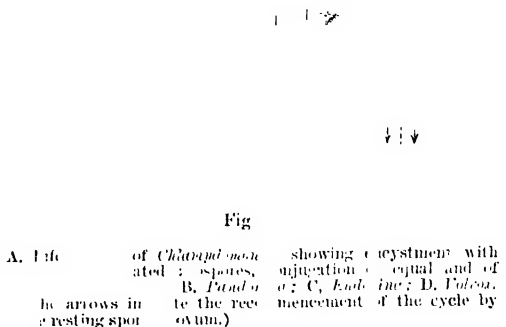


Fig.

A, Life of *Chlamydomonas* showing encystment with conjugation; B, *Palmella*; C, *Volvox*; D, *Volvox*. (The arrows in the resting spot indicate the position of the ovum.)

uniting or 'conjugating' in pairs to form a single cell, which, after a period of rest, divides and repeats the cycle anew. Such a form with eight segments is *Chlamydomonas*; with sixteen segments, *Palmella*. Among such forms, a differentiation of the conjugating cells becomes increasingly obvious, until the primitively equal and similar 'zoospores' become distinctly larger and smaller 'macro- and microspores' respectively; we have, in short, the dawn of sex. Vegetative progress also continues: the segmentation mass may increase to thirty-two or sixty-four, and after a brief period of agitation, may settle into a beautifully stellate figure like *Pediastrum*, or may even continue dividing till

many thousand minute cells are formed, which, on settling, elongate, and apply themselves point to point, so as to form a network of loose meshes (*Hydrodictyon*). Macrospores and microspores are here well distinguished; we have still, however, to seek for the full differentiation of sex. This occurs in such a form as *Potococcus*, where the segmentation mass forms a beautiful spherical layer of ciliated cells, connected by protoplasmic bridges, and embedded in a gelatinous matrix of undistinguishable cell-wall substance. After the vegetative growth has passed its climax, some cells begin to grow at the expense of others; of these, many become *ova*, while others, after a time, segment into tiny *spermatozoa* (for the familiar animal names of the essential sex-cells may be fairly applied). Fertilisation takes place in the usual way, and is followed by the segmentation of each ovum into a new colony.

But instead of the simple spherical segmentation of *Pandorina* or *Chlamydomonas*, which we may trace to the division in planes at right angles seen in *Protophyceus* (fig. 1), we may have the successive planes of division remaining parallel. Such successive divisions in parallel planes will produce a filament, and, as we have seen above, we thus enter among a vast new series of forms. The simplest of

ductive system is, however, still more remarkable; many species are constantly dioecious; the dwarfed male filaments grow on the larger female ones; spermatozoid and ovum respectively develop, with separation of portions recalling the sperm-cap and polar vesicle of animals, or the distinction of vegetative and reproductive nucleus demonstrated by Strasburger in the pollen grain (see OVTUM).

The remarkable and varied *Desmidiæ* and *Diatomeæ*, so familiar to microscopists, though rarely filamentous, are usually regarded, on account of their habit of conjugation, as allied to the *Miscocarpeæ*; but since they are on many grounds entitled to separate and fuller treatment, their structure and affinities need not here be discussed (see DESMIDS, DIATOMS).

Branching occurs at various points in this filamentous series, and this readily leads us to the formation of bi-dimensional (flat) cell-aggregates, such as the common green *Ulea* of every sea-shore. Here we start afresh with rejuvenescence by swarm-spores, capable of reproducing the parent plant without conjugation; in higher genera at least (*Euteromorpha*), conjugation occurs, and macrospore and microspore are distinguishable; while the change from a plane to a tubular arrangement of cells in *Euteromorpha* leads us to solid or tridimensional forms.

Before entering, however, on the study of these complex multicellular forms, we should return to note the unexhausted possibilities of unicellular differentiation. Hitherto we have examined different modes of cell-division, but we may imagine the necessity of this superseded by the continuous growth and regional differentiation of the primitive cell. Such a form is commonly presented us by the remarkable *Botryllum*, not uncommon in greenhouses (fig. 5, C). Here the cell elongates vertically, without division, into what is curiously analogous to the ascending and descending axis of a higher plant. The upper portion remains above ground, expands, and vegetates; the lower divides into colourless processes, which perform both the mechanical and absorptive functions of roots. Multiplication may take place by simple lateral gemmation, or by other methods, varying



Fig. 4.

A, Life-hill of *Ulothrix*; B, of *Mesodermium*; C, of *Ulothrix*; D, of *Mesodermium*.

these, as already stated, merely vegetate indefinitely, with periods of repose, without showing any signs of conjugation or the sexual process. In many *Confervæ*, however, the process of rejuvenescence occurs, and the zoospores may conjugate; in the lowest of which conjugating forms the zoospores are equal and similar, but the differentiation of macrospore and microspore soon arises (*Ulothrix*). Again, the motile phase may entirely disappear, and conjugation without rejuvenescence take place between the cells of parallel filaments; here, as formerly, equality and similarity may be perfect (*Miscocarpus*); or incipient sex may manifest itself (*Spirogyra*); finally, sex may become perfected (*Sphaerocysta*). Yet a further specialisation is possible: the reproductive changes may be restricted to definite cells or portions of the filaments; and such a case is afforded by *Edogonium*. This peculiar form is characterised, so far as its vegetative system is concerned, by the peculiar specialisation for the opening and the repair of that (in other forms irregular) rent of the cell-wall which is necessary for rejuvenescence. The repro-

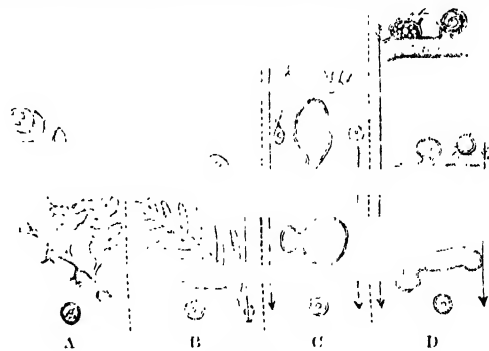


Fig. 5.

A, *Conferva*; B, *Euphyss*; C, *Botryllum*; D, *Voucheria*.

widely with the conditions of the environment. In ordinary circumstances, when moisture is abundant, the protoplasmic contents simply break up into zoospores, which, on settling down with or without conjugation, reproduce the plant. Under the influence of drought and sun, the protoplasm descends into the root filaments, and there encysts itself, rejuvenescence by and-by taking place as usual, while, on the approach of winter, the encystment takes place with the upper vegetative portion of the cell, which becomes gradually thickened. Another very interesting allied form is *Voucheria*

(fig. 5, D). Here the cell lengthens into a filament, and distinct male and female organs differentiate from short lateral branches, true sexual fertilisation occurring. In some species, however, all the less differentiated modes of reproduction have been observed; thus in *Faucheria sessilis*, a many-ciliated zoospore is formed, which is active for hours; in another (*F. sericea*), this is only active for a few minutes, and in *F. geminata* it never issues at all, but simply rejuvenesces without leaving its cell-wall, like a pollen grain; finally, the quiescent bud simply drops off (*F. tuberosa*), to germinate into a new filament. The marine types start with simple forms *Falonia* recalling *Botrydium*, as *Codium* does *Faucheria*—but assume a high degree of vegetative complexity, e.g. the mushroom-shaped *Alect. ularia*, or the branched *Bryopsis*. With this increase of vegetative differentiation, the converse reproductive degeneration is beautifully illustrated. Thus the former still multiplies by zoospores which conjugate, but those of the latter simply rejuvenesce, and the plant is more frequently reproduced by vegetative buds; while in the enormously ramified and complex, but still unicellular *Codium*, the mode of multiplication seems to be reduced to occasional gemmation from the relatively less vegetative root portion alone.

We have now surveyed the families of lower algae, and have seen that the degree of differentiation of the reproductive process in the direction of definite sex runs broadly parallel, while the vegetative structure is much more widely differentiated. It is therefore rather by the latter that we must especially classify, and, without insisting on a too rigorous application of this principle, it is evident (1) that, as has long been increasingly obvious, the *Padinellaceae* represent, or, at any rate, include largely the vegetative states of higher forms; (2) that the *Protococcaceae*, *Pandorineae*, *Hyalodictyaceae*, and *Volvocineae* form another natural series, characterised by their mode of cell division and aggregation; (3) that the *Confervae* lead to *Ulveae* on one hand, and to *Chaetophoraceae*, *Ulothrixaceae*, and *Sphaerophyceae* on others, the *Coelastrum* being also not very far remote; while (4) the *Siphonaceae*, despite the necessary parallelism of their reproductive evolution, represent an exceedingly distinct and lower type of structure, which separates them from all the alga proper.

The brown seaweeds (*Phaeophyceae*, *Eucaceae*) and the red seaweeds (*Florideae*) are of much greater complexity, both vegetative and reproductive, than any of the preceding forms, and may conveniently receive separate treatment (see SEAWEEDS).

Algardi, ALESSANDRO, born at Bologna in 1602, ranks next to Bernini among Italian sculptors of the 17th century, and excelled especially in the representation of the nude. His works, however, suffered from a striving after picturesqueness, opposed to the simplicity of true sculpture. The most important is a colossal relief, in St Peter's, of Pope Leo restraining Attila from marching on Rome. Algardi died in 1654.

Algaroba. See CAROB.

Algarotti, FRANCESCO, an Italian author, was born at Venice in 1712, studied in Rome and Bologna, and in his twenty-first year visited Paris, where he published *Newtonianismo per le Donne* (1733), the basis of his subsequent reputation. Until 1739, he lived in France. On his return from a journey to Russia, Algarotti became acquainted with Frederick the Great, who in 1740 made him a count; in 1747, chamberlain. Patronised also by Augustus III. of Poland, he lived alternately in

Berlin and Dresden until 1754, when he returned to Italy. He died March 3, 1764, at Pisa, where Frederick raised a monument to his memory. His repulse as a connoisseur is confirmed by his *Saggi sopra le Belle Arti*, and by the paintings he selected for the Dresden Gallery. His poetry displays no great genius; but his letters rank with the best in the Italian language. There is a good edition of his works in 17 vols. (Venice, 1791-94).

Algarvê, the smallest and most southerly of the provinces of Portugal. The name is Arabic, and means 'a land lying to the west.' It was a Moorish province till 1253. Its area is 1873 sq. m. and its pop. (1881) 204,037. The northern part of the province is occupied by a range of barren mountains of an average height of 4000 feet, terminating in Cape St Vincent; and the country slopes southward to the narrow level tract along the coast. The plain, unsuitable for grain, produces abundance of fruit and wine. The inhabitants employ themselves chiefly in fishing, in manufacturing salt, and in cultivating fruit. The chief town is Faro.

Algazali. See GHIAZZALI.

Algebra is a branch of pure mathematics. The name is derived from the Arabs, who call the science *Al-jabr wa'l muqabalah* ('redintegration and equation'). The term algebra is generally used to denote a method of calculating by means of letters which are employed to represent the numbers, and signs which are employed to represent their relations. Literal arithmetic, then, or multiplying, dividing, &c. with letters instead of Arabic ciphers, is properly only a preparation for algebra; while Analysis (q.v.), in the widest sense, would embrace algebra as its first part. Algebra itself is divided into two chief branches. The first treats of Equations (q.v.) involving unknown quantities having a determinate value; in the other, called the Diophantine or Indeterminate Analysis, the unknown quantities have no exactly fixed values, but depend in some degree upon assumption.

The oldest work in the West on algebra is that of Diophantus of Alexandria, in the 4th century after Christ. It consisted originally of 13 books, and contained arithmetical problems; only six books are now extant. They are written in Greek, and evince no little acuteness. The modern Europeans got their first acquaintance with algebra, not directly from the Greeks, but, like most other knowledge, through the Arabs, who derived it, again, from the Hindus. The chief European source was the work of Mohammed Ben Musa, who lived in the time of Calif Al Mamun (813-833); it was translated into English by Rosen (1831). An Italian merchant, Leonardo Bonaccio, of Pisa, travelling in the East about 1200, acquired a knowledge of the science, and introduced it among his countrymen on his return; he left a MS. work on algebra. The first work on algebra after the revival of learning is that of the Minorite friar Paciolo or Luca Borgo (Ven. 1494). Scipio Ferreo in Bologna discovered, in 1505, the solution of one case of cubic equations. Tartalea of Brescia (died 1557) carried cubic equations still further, and imparted his discoveries to Cardan of Milan as a secret. Cardan extended the discovery himself, and published, in 1545, the solution known as 'Cardan's Rule.' Ludovico Ferrari and Bombelli (1572) gave the solution of biquadratic equations. Algebra was first cultivated in Germany by Christian Rudolff, in a work printed in 1524. Stifel followed with his *Arithmetica Integra* (Nürnberg, 1544). Robert Recorde in England, and Pelletier in France, wrote about 1550. Vieta, a Frenchman (died 1603), first made the grand step of using

letters to denote the known quantities as well as the unknown. Harriot, in England (1631), and Girard, in Holland (1629), still further improved on the advances made by Vieta. The *Géométrie* (1637) of Descartes makes an epoch in algebra; it is rich in new investigations. Descartes applied algebra to geometry, and was the first to represent the nature of curves by means of equations. Fermat also contributed much to the science; and so did the *Arithmetica Universalis* of Newton. To these names may be added Maclaurin, Moivre, Taylor, Fontaine; and later, Euler, Lagrange, Gauss, Abel, Fourier, Peacock, De Morgan, Sylvester, Cayley, are the most prominent of recent contributors to the science. See articles on BINOMIAL THEOREM, EQUATIONS, FRACTIONS, INDETERMINATE PROBLEMS, INVOLUTION AND EVOLUTION, PERMUTATIONS AND COMBINATIONS, PROGRESSION, PROBABILITIES, SERIES.

Algeci'ras, or ALGEZIRAS, a town in Spain, in the province of Cadiz, on the Bay of Gibraltar. Its harbour is bad, but it possesses a good dock. The citadel is in a very dilapidated condition; but the streets, though dirty and silent, look picturesque. The town is 5 miles from Gibraltar across the bay or gulf, and 9 round by land. Charcoal and tanned leather are the chief articles of export; the oranges of Algeciras are famous, as well as its bull-fights. Pop. (1878) 12,165. It was the first town in Spain taken by the Moors (711), in whose possession it remained for seven centuries, but in 1344 it was retaken by Alfonso XI., king of Castile, after a twenty months' siege that attracted the interest of all Christendom. Alfonso destroyed the old Moorish town; the modern one was built by Charles III. in 1760. On the 6th of June 1801, between Algeciras and Tarifa, the English admiral Saumarez attacked the combined French and Spanish fleets—was defeated, but renewed the engagement on the 12th, and gained a complete victory.

Algeria (Fr. *Algérie*), a country on the north coast of Africa, which, since 1830, has been gradually taken possession of by the French, and is now regarded by them as an outlying part of France rather than as a colony. It lies between Morocco on the west side, and Tunis on the east, extending from west to east from about 2° 8' W. to 8° 50' E. long. It extends from the Mediterranean on the north side, to an ill-defined limit on the south side, which may, however, be generally taken at the extreme as the 30th parallel north, from Ghadames on the frontier of Tripolis on the east, to a point north of Gurara, an oasis of Tiat, on the west. The total area would thus be about 255,000 sq. m., or more than twice the size of Great Britain and Ireland.

Configuration of Surface.—The coast line on the north, about 625 miles long, in the form of a very gentle curve, is little indented, steep and rocky, with only a few capes, and comparatively few good ports. From the coast inwards Algeria is marked off into three distinct regions: in the north, the *Tell*—mountainous, cultivated land, with fruitful valleys; in the middle, the region of Steppes—mountainous tableland, traversed from west to east by a string of brackish lakes or marshes, called *Skotts*; farther south—the Algerian Sahara, with oases. The Tell, on the north side, is marked by a series of mountain-chains, called by the French the Lesser Atlas or Coast Mountains, comprising the Mountains of Blidah, 5381 feet high, and Jurjura, with the peak of Little Khedija, 7572 feet. Farther south, forming the south limit of the Tell, is a parallel chain, the Middle Atlas, extending from west to east. The Tell, forming the mountainous, most fertile, and much the

most populous section of Algeria, occupies an area altogether of about 54,000 sq. m., with an average breadth of about 47 miles. The central part of the country—the region of plateaux—extends farther south, from the borders of Morocco to those of Tunis. When the winter rains are past, the plateau, usually so bare and dreary, grows suddenly fresh with long grass and aromatic herbs, yielding fodder to the cattle that are there reared. The south limit of the middle tableland of Algeria is formed by the chain forming the north boundary of the Sahara, culminating in Sheliah, 7585 feet, the highest point of Algeria. The Algerian Sahara, constituting the third division of Algeria, and covering an area larger than that of both the divisions to the north of it, consists partly of sandy dunes, partly of country covered after rain with herbage; and there are oases round the wells. The Sahara is diversified by masses of rock, often ranged in long parallel chains. The Wady Igharghar is a channel 750 miles long, running from south to north.

The more considerable streams of Algeria rise in the *middle region*, and have therefore to seek their outlet in the Mediterranean, through passes in the middle and coast ranges. They are mostly of a slow current with narrow mouths often choked with sand. Though swollen in the winter, they shrink in the summer to a thread, or even quite out of sight. Not one of them is navigable, but they are used for purposes of irrigation.

Climate. The climate of Algeria is distinguished into only three seasons: winter, from November to February; spring, from March to June; summer, from July to October. In winter is the rainy season; rain falls especially in October and November. The season most congenial for Europeans is spring. In July begins the great heat, and on through the four summer months it is seldom that any rain falls. After a hot day, the night is often very cold. The climate of the Sahara is quite tropical and very oppressive to Europeans. The planting of forests, drainage, and irrigation, under the French, are effecting a great improvement in the climate. The draining of Lake Hallula in the plain of Metija has given 34,000 acres of good land to cultivation.

Products. In the Sahara, by the sinking of artesian wells, desert tracts have been converted into cultivated land, and in ten years the inhabitants of the Sahara oases have increased from 6600 to 13,000, while about 517,000 palms and 90,000 fruit-trees are now counted. Algeria is coming to the front as a wheat-growing country, and between 1869 and 1885 had doubled its export of this cereal. Fruits and vegetables are grown in large quantities in the neighbourhood of the town of Algiers, for the markets in France, England, and Germany. The cultivation of the grape, silk, and tobacco is rapidly extending. Immense tracts of land, suitable for no other cultivation, are being successfully planted with vines, and Algeria promises to develop into a great wine-producing country. The forest vegetation of Algeria is extremely rich by nature, comprising pine, oak, cedar, pistachio, mastie, carob, olive, myrtle. Special exports are cork and alfa or esparto grass. In 1885, 45 million acres were occupied by an agricultural population, fifteen-sixteenths being in the hands of Europeans. Of this area, 7,300,000 acres were under cereals, 113,000 acres under vines, 21,700 acres under tobacco, 5 million acres under forest. The tablelands grow an inexhaustible supply of alfa. Algeria has been ascertained to have a very considerable wealth of metals, iron and copper being particularly abundant, though yet little worked. Over 100 mineral springs are counted in Algeria.

Population, Trade, and Industry.—Officially,

Algeria is divided into a civil territory of three departments, and a military territory of three divisions, distributed as follows :

Territories.	Area in sqn. kilometre.	Population.
CIVIL DEPARTMENTS :—		
Algiers Province.....	23,550	1,902,768
Oran Province.....	21,643	752,354
Constantine Province.....	26,043	1,369,153
	74,236	3,324,475
MILITARY DIVISIONS :—		
Algiers Province.....	81,617	177,773
Oran Province.....	61,460	117,351
Constantine Province.....	101,021	197,266
	244,098	492,390
Total -Algeria, exclusive of Sahara	318,334	3,817,405

Of a population of 3,310,412 in 1881 (excluding nomads), 233,937 were French, 35,665 Jews, 114,320 Spaniards, 33,695 Italians, 15,402 Anglo-Maltese, 4261 Germans. The number of Europeans, in 1830 only 600, and in 1840, 27,000, amounted in 1881 to over 400,000. The French Mussulman subjects numbered, in 1881, 2,850,866. The native population is divided between Arabs and Berbers. To the former belong the Bedouins living in tents or travelling huts, and dating mostly from the third Arab invasion in the 11th century. They live chiefly in the Tell, tilling the land and rearing cattle, but are also numerous in the Sahara, where they only rear cattle. The Moors, settled in towns, about 2 millions, are partly of Arabian and partly of the old Mauritania or Berber stock; they are an impoverished and dwindling population. The Kabyles or old Berbers, about 700,000, inhabit mostly Constantine. There are also negroes employed as day labourers and servants. In 1885, 1050 English miles of railway were open for traffic, and in 1887 the railway from Oran to Tunis, *via* Algiers and Constantine, between 800 and 900 miles long, was completed. The telegraph of Algeria, including branches into Tunis, measured in 1886, 11,112 miles of wire. Telephones are also set up in Algiers and Oran. Algeria possesses 192 post and 44 telegraph offices. The caravan routes of Western Algeria, starting from Oran and Tlemcen, lead first to Tost and Insalah, and thence to the Sudan, the Negro lands, and Timbuctoo. These highways are equally in communication with the provinces of Algiers and Constantine.

The trade of Algeria shows a constant increase. Since the French occupation, the imports have increased fifty, and the exports one hundred-fold. The imports, three-fourths of which come from France, varied in the period 1881-85 from £8,800,000 to £12,000,000. The exports, two-thirds of which go to France, varied from £6,000,000 to close on £8,000,000. The imports are chiefly manufactured cotton, hemp, linen, silk, and woollen stuffs; cloths, sugar, hides, paper, liquors, metals, building materials, &c. The exports are cereals, wool, raw hides, living animals, minerals, early fruit, alfa and other vegetable fibres, cork, iron, copper, and lead ores.

Administration and Religion.—From 1834 down to 1870 Algeria was entirely under military rule. At that date a civil governor-general, with residence at Algiers, was substituted for the former military governor, to administer the government of the colony. The new civil government extends, however, only over the settled districts, the Sahara and adjoining districts being still under military rule. The governor-general is assisted by a council whose function is purely consultative. The colonists send two deputies and one senator for each department to the French Chamber. Mediators between the native chiefs (sheikhs) and the government authorities are formed by the *Borjate Arabes*, whose function it is to take care of the religious and civil interests of the Arabs on

the one side, and of the colonists in their relations to the natives on the other.

The French troops in Algeria consist of one corps d'armée which, including gendarmerie, numbers upwards of 52,000. These are divided into a French corps remaining in garrison in Algeria a certain number of years, after which they return to France, and native troops which may quit Algeria only on extraordinary occasions. This latter division consists of three regiments of 'Tirailleurs Algériens' and three of 'spahis.' There are four regiments of 'Chasseurs d'Afrique' and of Zouaves, consisting solely of French officers and soldiers. A Foreign Legion, besides, of various nationalities, is mostly officered by Frenchmen. In general, all the inhabitants of Algeria are subject to the French tribunals. At the head of the Roman Catholic Church in Algeria is the Archbishop of Algiers, with four vicars-general. Though the mosques and their lands are declared to be state property, the Mohammedan cult is supported by the state.

History.—In the most ancient times we find the Numidians settled in the eastern part of the region, and the Moors (or Mami) in the west. Under the Romans, the former was included in the province of Africa, while the latter was called Mauritania Cæsariensis. It had then populous cities, which were principally Roman colonies. But its conquest by the Vandals, about 440, threw it back into a state of barbarism, from which it only partially recovered after the Mohammedan immigrants had established their dominion. About the year 935, the city of Algiers (q.v.) was built by an Arabian prince, Zeiri, whose successors ruled the land till 1148, after which it was governed by the Almohades till 1269. It was then split up into many small territories. In 1492 the Moors and Jews who had been driven out of Spain settled in Algeria, and began to revenge themselves on their persecutors by piracy. Ferdinand, the Spanish monarch, attacked them on this account, and took the city of Algiers in 1509. One of the Algerine princes, the Emir of Metija, now invited to his assistance the Greek renegade, Horuk Barbarossa, who had made himself famous as a Turkish pirate chief. This laid the foundation of the Turkish dominion; for when Barbarossa arrived in 1516, he treacherously turned his corsair bands against the emir, whom he murdered, and then made himself sultan of Algiers. His subsequent successes alarmed the Spaniards, who marched an army against him from Oran. Barbarossa was defeated in many encounters, and, at last, being taken prisoner, was beheaded in 1518. His brother was then chosen sultan. He put himself under the protection of the Ottoman court, by the help of a Turkish army drove the Spaniards out of the country, and established that system of military despotism and piracy which the English, Dutch, French Spaniards, and Americans from time to time in vain endeavoured to extirpate, and which lasted till 1830. In that year the town of Algiers capitulated to a French fleet, and the French took possession of the place.

After the revolution of 1830, General Clausel set about subduing the country, and giving it a regular government; but he encountered the most determined opposition in Abd-el-Kader (q.v.), who soon became the rallying point of the 'holy war,' which the Maraboutis had begun to preach. A disgraceful defeat suffered by the French army at Makta caused the recall of the first governor-general, D'Erlon. Clausel was now sent back to Algeria with the title of marshal; but Abd-el-Kader was soon more powerful than ever, and General Bugeaud had to be sent out from France with reinforcements. In February 1837 Marshal Clausel was recalled, and General Dauré-

mont succeeded him. He first attacked the Kabyles of the province of Algiers, and chastised them with severity, and then commenced his great work of taking Constantine, which he ultimately succeeded in storming in May. This victory laid the foundation for the entire subjugation of the province of Constantine.

In 1837 General Valée was appointed governor-general. He, like the others, misunderstood the character of Abdel-Kader. New treaties were made, which only delayed hostilities. At last, however, deserted by most of his followers, and hemmed in on all sides, the Arab chief was forced to surrender to General Lamoricière at the close of December 1847.

In 1848 the Kabyles broke out into a new insurrection, which, however, was speedily quelled. The French troops penetrated into the far south, almost to the borders of Sahara. In 1853-4, and again in 1856-7, expeditions were organised against the Kabyles. The struggle was sanguinary and barbarous on both sides; and it was only after several defeats sustained by the Kabyles, that, in 1864, peace was restored by the submission of the conquered tribes. Pélissier having died in 1864, Marshal MacMahon was appointed to succeed him. In the following year the Emperor Napoleon made a journey to Algeria, and issued a proclamation, in which, although explaining to the Arabs that Algeria must continue to be united to France, he promised to maintain their nationality; and at the same time gave them assurance that they should always remain in undisturbed possession of their territories. There was peace till 1870, when, the Franco-Prussian war having begun, the emperor found it necessary to withdraw to Europe the greater part of the forces in Africa; and the natives began to entertain hopes of freeing themselves from the yoke of France. Movements were begun in the provinces of Constantine and Oran, which it required all General Durien's vigilance and activity to hold in check. After this, again, some disorder arose among the colonists themselves, who strongly desired the abolition of the military government—a change which the new republican government at Paris soon gratified them by effecting. To Durien's place was appointed a civil governor, and under him prefects for each of the three provinces. In 1881, when France entered on a campaign against Tunis, a chief raised the standard of revolt in Algeria, and inflicted considerable losses on the French colonists.

See works on Algeria by Niort (1884), Gaffard (1883), Bécquet et Simon (1883), MacCarthy (Paris, 1857), Pillias (3d ed. 1874), Nettement (2d ed. 1871); also Réclus, *Nouvelle Géographie* (1877); A. Rambaud, *France Coloniale* (1886); Certeux and Carnoy, *L'Algérie traditionnelle* (vol. i. 1844); and De Lamoignon, *L'Expansion Coloniale de la France* (1886).

Algero, a seaport on the west coast of the island of Sardinia, 15 miles SW. of Sassari. It has a cathedral, a nautical college, and public schools, and is the seat of a bishop. Wine, anchovies, and coral are exported. Pop. 8995.

Algiers (Fr. *Alger*; Arabic *Al-jazair*, 'the islands'), the capital of Algeria, was built about 935 A.D. by an Arab chief. It rises from the sea-shore up the sides of a precipitous hill in the form of an equilateral triangle. The apex is formed by the Kasbah, the ancient fortress of the *deys*, which is 500 feet above the sea-level, and commands the whole town. The base is a mile in length. The present city is divided into two parts—the old, or high town; and the new, or low town. With the exception of some mosques, the latter consists of warehouses, government houses, squares, and streets, principally built and inhabited by the French; while the former is almost wholly Moorish

both in its edifices and inhabitants. The city is intersected by two large parallel streets, Bab-el-Onal and Bab-azoun, running north and south for more than half a mile; but the new town of Algiers might deceive the traveller into the belief that he is still in Europe, were it not for the throng of swarthy faces he meets. The streets are regular, spacious, and elegant; some of them as handsome as the Parisian Boulevards, and adorned with arcades. The great glory of the city is the Boulevard de la République, with its magnificent terrace, built in 1860-66 by Sir Morton Peto, at a cost of eight million francs. Here may be found as motley a crowd as anywhere in the world, denizens of all nations—Arabs, Moors, and Jews; French, Spaniards, Maltese, English, Germans, and Italians. The shops, too, are occasionally very good. The houses are in some instances five stories high. But perhaps greater interest attaches to the Old Moorish town, which is connected with the new by a steep, narrow, jagged-looking street called the Kasbah, leading down from the fortress of the deys. The houses are square, substantial, flat-roofed; rise irregularly one over the other; and have no windows to the streets, but only peep-holes, fortified with iron gratings instead of glass, so that the houses have a very prison-like appearance. There are numerous mosques and tombs of saints. The French have at great expense improved the port, which is safe and spacious and has a lighthouse. It is strongly fortified, and can contain 40 warships and 300 trading vessels. The original harbour was made in 1525 by connecting with the shore four little islands (hence the name of the city). Near the great quays is the railway station, connecting Algiers with Constantine and Oran. The town has supreme courts of justice, the military and civil headquarters for the province, a chamber and tribunal of commerce, a college and schools, a Catholic cathedral and several churches, a French Protestant church, an English church, a synagogue, a library, museum, hospitals, theatres, and banks. There is a great trade, Algiers being the chief commercial place in Algeria; the produce of the interior is exported, the imports being mainly French goods, with British coal, iron, and cottons. Recently, Algiers has become famous as a winter residence for Europeans suffering from chest diseases; the village of Mustafa, near the city, is the resort in summer of the governor and wealthier citizens. The city, which had been wretchedly misgoverned by a long succession of Turkish deys, fell into the hands of the French in 1830 (see ALGERIA). Of the 70,717 inhabitants in 1881, only 16,000 were French; while 18,000 were of other European nations, 12,000 Moslem natives, mainly Moor; and 7000 Jews.

Algin. On the surface of certain species of seaweed—notably of those belonging to the genus *Laminaria*—there is sometimes seen a jelly-like material, which is partly formed of a substance called algin, and may be drawn out by the fingers in long tenacious strings. The cell-walls of our common brown seaweeds (*Fucox* and *Laminaria*) are, in fact, very mucilaginous, and all contain algin, which has somewhat remarkable properties. This substance was discovered in 1881 by Mr E. C. C. Stanford of Glasgow. If the leaf-like thallus of a *Laminaria* are immersed in water containing a little carbonate of soda, the whole cellular fabric of the plant becomes broken up in the course of twenty-four hours, forming a thick gelatinous mass containing about 2 per cent. of algin. This mass, after being cautiously heated, is filtered through coarse linen, and the cellulose which is left behind amounts, when dry, to from 10 to 15 per cent. of the air-dried plant. The solution which passes

through the filter contains, in addition to the algin in the form of alginate of soda, some mucilage and dextrine. When sulphuric or hydrochloric acid is added, the algin, or, more correctly speaking, the alginic acid, separates in flocks, and is easily washed and pressed in a filter-press. In this condition it forms a compact cake not unlike new cheese. Chemically, it is a nitrogenous organic acid, and is the insoluble form of algin. When required for use in a soluble state, it is redissolved to saturation in solution of carbonate of soda, when alginate of soda is again formed.

The properties of algin in the soluble form are those of a very viscous gum, drying up to a transparent elastic film. As a size or dressing for textile fabrics, experiments have shown that algin goes further and does more work than starch or any of the ordinary gums, and it has the advantage of being easily rendered insoluble in water. Algin makes an excellent thickening for soups, and with the addition of a little gelatine or isinglass, is serviceable for jellies. The insoluble form of algin, in the dry state, resembles horn, and can be turned and polished. Different compounds of algin are now being experimented with for various other purposes in the arts.

Algoa Bay, a broad inlet at the eastern extremity of the south coast of Africa, with a sheltered anchorage except towards the south-east. Port Elizabeth lies in the south-west angle of the bay, the western horn of which is Cape Recife.

Algonquins, the most prominent of the three aboriginal races (the other two being the Hurons and Iroquois) that occupied the great basin of the St. Lawrence at the beginning of the 17th century. In what is now the United States, the Algonquin tribes occupied all the coast-region from the N.E. limit to the James River in Virginia, and were found westward nearly as far as the Rocky Mountains. The Six Nations, and other tribes of Iroquois, were surrounded by Algonquins. The Acenakis, the Miamiacs, the Delawares, the Mohicans, the Shawnees, the Pequotis, the Ojibways, the Crees, and perhaps also the Blackfeet and Cheyennes, were among the numerous tribes of Algonquin stock. In a much narrower sense the name is now applied to the relics of an Indian people in the province of Quebec, Canada. See Leland's *Algonquin Legends of New England* (1881).

Alguacil, or ALGUACIL (Arabic *al wazir*, 'the vizier'), is the general name in Spain of the officers intrusted with the execution of justice.

Alhagi is an Arabic name for a genus of trees from which Manna (q.v.) exudes.

Alham'a (Arabic *Al Hamma* 'the bath'), a town of Andalusia, Spain, in the province and 24 miles SW. of Granada. Its situation is extremely picturesque, on the edge of a projecting rock; but it is a decayed town, although its warm sulphur baths are still frequented by visitors. It was a famous fortress of the Moors; and there are still remains of Roman and Moorish buildings. The town was much injured by a severe earthquake in the end of 1885. Pop. 7758.

ALHAMA DE ARAGON, 8 miles SW. of Calatayud, has famous mineral springs. Pop. 1278. **ALHAMA**, 13 miles SW. of Murcia, is also celebrated for its warm mineral waters. Pop. 6298.

Alham'bra, a fortified suburb of Granada, which forms a sort of acropolis to the city, and in which stand the exquisite remains of the palace of the ancient Moorish kings of Granada. The name is a corruption of the Arabic *Kal'at al hamra*, 'the red castle.' It is surrounded by a strong wall, more than a mile in circuit, and studded with towers. The towers on the north wall, which is defended by nature, were used as residences connected with the palace. One of them contains the famous *Hall of the Ambassadors*. The remains of the Moorish palace are called by the Spaniards the Casa Real. It was begun by Ibn-Ishmar (1248), and completed by his grandson, Mohammed III., about 1314. The principal decorator was Yusuf I., who regilt and repainted the palace; and even yet, in the dry climate of Spain, traces of his work have been preserved. The portions still standing are ranged round two oblong courts, one called the *Court of the Fish-pond*, the other the *Court of the Lions*. They consist of porticos, pillared halls, cool chambers, small gardens, fountains, mosaic pavements, &c. The



Alhambra.

lightness and elegance of the columns and arches, and the richness of the ornamentation, are unimpaired. The stone lacework scattered over all the building appears to those ignorant of Arabic mere quaint and beautiful scrolls, but is really a complex arrangement of Arabic poetry and verses from the Koran. The colouring, which often is marvellously preserved, employs only the three primary colours, among which the metallic blue greatly predominates, although the atmosphere has transformed much of it to green. Entrance is by a horseshoe arch, called by the Moors the 'gate of the law,' where the king sat to administer justice. Here, as almost everywhere else, the Moorish diaper-work is richly broken, in this instance to make a niche for a wooden image of the Virgin. In the most beautiful room in the palace, the *Hall of the Abencerages* (q.v.), the beauty of colour and of ornamentation is added an arcade resting on light and graceful marble arches that run round the place. The most characteristic parts of the Casa Real have been reproduced in the 'Alhambra Court' of the Crystal Palace at Sydenham. A great part of the ancient palace was removed to make way for the palace begun by Charles V., but never finished. Since then it has suffered from the neglect and greed of successive governors; from the French, who blew up eight of its towers and tried to destroy the whole; and from earthquake. A partial restoration was made at the expense of Queen Isabella (1862). See the works by Washington Irving

(1832), Owen Jones (1848), and Murphy (new ed. 1856); see also ARABESQUE and ARABIAN ARCHITECTURE.

Ali, the first convert to Mohammedanism, and fourth of the califs, was the son of Abu Taleb, the Prophet's uncle. He was the bravest and most faithful follower of the Prophet, whose daughter Fatima he married. Being made calif in 656 A.D., in the place of the murdered Othman, he was ultimately, after a sore struggle, victorious over those who opposed his authority, and took prisoner Ayesha, the young widow of Mohammed, who was the soul of the rebellion. Ali was assassinated in the year 660, and buried near Kufa. The question of his right to succeed to the califate permanently divided the Mohammedan world; the Shiites (q.v.) still reverencing him as next to Mohammed, while the Sunnites (q.v.) abhor his memory. Famed for his wisdom, his maxims and religious lyrics are still extant. The best edition of the former is that of Fleischer (Leip. 1837); the latter were printed at Boulak in 1840. The Fatimite (q.v.) califs claim to be descended from him.

Ali Bey, of Egypt, was a Caucasian slave, born in 1728, who rose to be chief of the Mamelukes in 1763, gained followers, slaughtered the other beys in 1766, and was proclaimed sultan in 1768. He made himself independent of the Porte, and had conquered Syria and part of Arabia, when one of his sons-in-law deserted him, and raised an army against him in Egypt. In April 1773 he was defeated in battle, and a few days after died of his wounds or of poison.

Ali Pasha (surnamed *Arslan*, 'the Lion') was born in 1741, at Tepeleni, a village of Albania. His mother, a vindictive and merciless woman, inspired him with the remorseless sentiments that animated herself. His youth was passed in extreme peril and hardship, for the neighbouring pashas had robbed his father of nearly all his possessions, in the effort to recover which, young Ali was repeatedly defeated. It is said that the change in his fortunes arose from his accidental discovery of a chest of gold, with which he raised an army of 2000 men, gained his first victory, and entered Tepeleni in triumph. On the very day of his return, he murdered his brother, and then, on the charge of having poisoned him, imprisoned his mother in the harem, where she soon after died. He next reconciled himself to the Porte by helping to subdue the rebellious Vizier of Sutar. Appointed lieutenant to the Derwend Pasha, an officer charged with the suppression of brigandage, he rendered the high-roads more insecure than ever, sharing in the plunder of the *khephts* (robbers). The result was his deposition by the Porte; but he speedily bought back its favour, for he was a master-hand at bribery. Shortly after this, he did such good service to the Turks in their Austro-Russian war of 1787, that he was named pasha of Trikala in Thessaly; at the same time he seized Janina, of which he got himself appointed pasha by the instrumentality of terror, a long firman, and bribery. In 1797 he entered into alliance with Napoleon, who sent him engineers; but next year, after the battle of Aboukir Bay, he wrested the seaport Prevesa from the French. After a three years' war, he subdued the Suliots, for which the Porte promoted him to be governor of Rumili. About this time, he revenged on the townsfolk of Gardiki an outrage done to his mother forty years before, by the murder of 739 male descendants of the original offenders, who themselves were all dead. Within his dominions, Ali maintained strict order and justice. Security and peace reigned, high-roads were constructed, and industry flourished, so that the European

travellers, with whom he willingly held intercourse, considered him an active and intelligent governor. From 1807, when he once more formed an alliance with Napoleon, Ali's dependence on the Porte was merely nominal. Having failed, however, to obtain at the peace of Tilsit, Parga, on the coast of Albania, and the Ionian Islands, he now entered into an alliance with the English, to whom he made many concessions. In return, they granted Parga nominally to the sultan, but really to Ali. As he now deemed his power securely established, he caused the commanders of the Greek Armatoles (or militia), who had hitherto aided him, to be assassinated one by one, while at the same time he put to death the assassins, to save himself from the suspicion of having been their instigator. The Porte resolved at length to end the power of this daring rebel; and in 1820, Sultan Mahmud sentenced him to be deposed. Ali resisted for a time several pashas that were sent against him; but at last surrendered, on the security of an oath that his life and property would be granted him. Regardless of this, he was put to death, February 5, 1822.

Alias is a name given in England to a second writ issued when the first has failed, but is more commonly used in both England and Scotland as part of an indictment describing a prisoner who goes by more names than one. The indictment used to be in Latin, and *alias dictus* is (late) Latin for 'otherwise called.' The name given to the prisoner at baptism or confirmation should be given; but what is essential is to exclude reasonable doubt as to identity, and so a man without a name may be indicted, if otherwise identified, and mistakes in the indictment may be amended. Aliases are generally used at trial for the purpose of proving previous convictions under the other names. It has, however, been proposed to abolish aliases in criminal pleading.

Alibi (Lat., 'elsewhere') is a defence resorted to in criminal prosecutions, when the accused, in order to prove that he could not have committed the crime, tenders evidence to the effect that he was in a different place at the time the offence was committed. In Scotland, though not in England, the prisoner must give notice to the crown of a special defence of *alibi*, stating where he was at the time of the crime. It is not uncommon for the family or friends to swear a false *alibi*, hence the necessity for notice.

Alicante, chief town of a province of the same name in Spain, situated on a bay of the Mediterranean Sea, 46 miles N.E. of Murcia by rail. The castle of St Barbara commands the town and bay. The town with its background of mountains looks picturesque from the sea. It is the third seaport in the kingdom, and its harbour is spacious and secure. It is well known to be a centre of smuggling. The chief exports are esparto grass, lead, wine, almonds, and liquorice root; tobacco, railway material, petroleum, dried codfish, timber, and spirit for strengthening wine are imported. Value of imports in 1886, over £800,000; of exports, £1,549,000. Though helped by the railway to Madrid (282 miles), trade is inactive. Its climate is well suited for invalids. In 1331 the town was besieged by the Moors; and again by the French under Asfeld in 1709. In 1873 it was unsuccessfully bombarded by two warships manned by the Cartagena insurgents. Pop. (1884) 35,479.—The province of Alicante, formed in 1834 of parts of the old kingdoms of Valencia and Murcia, has an area of 2098 sq. m. The surface is diversified with mountain-ranges in the north and west, but is more level to the south, with fertile valleys. The chief products are esparto grass, rice, sugarcane, and fruits. The wine of Alicante has a high

reputation, and attention is paid to the rearing of bees and silkworms. There are about twenty lead and copper mines. On the coast, the inhabitants are engaged chiefly in the tunny and anchovy fisheries, and the carrying trade. Pop. (1881) 427,818.

Alice-Maud-Mary, Grand-duchess of Hesse, was born 25th April 1843, the second daughter of Queen Victoria. In 1862 she married Prince Louis of Hesse, who succeeded his uncle as grand-duke in 1877; and she died at Darmstadt, 14th December 1878. Her *Letters* (1884), edited by the Princess Christian, with a memoir by Dr Sell, give a charming impression of an accomplished lady, lovable alike as daughter, wife, and mother, gracious and kind to all the world.

Alien (Lat. *alienus*, 'foreign'). The citizen of one state, when resident in another, unless naturalised (see NATURALISATION), is an alien. The condition of an alien does not necessarily result from foreign birth, for the son of a natural born or naturalised Englishman is not an alien, wherever he may be born. This privilege even extends to the second generation on the father's side; and thus a man whose paternal grandfather was an Englishman, is an Englishman himself, unless either his father or grandfather be liable to the penalties of felony, have been attainted of treason, or be living in the army of a prince at war with England at the period of his birth. Neither is this privilege affected by the fact that the mother or both persons were foreigners. The children of aliens born in England, except in the case of a hostile invasion, are natural born subjects; but the children of English women by aliens are aliens, unless born within the British dominions. Alien women married to natural-born subjects are naturalised. The allegiance due by an alien or stranger to the prince in whose dominions he resides, is usually called *local* or *temporary allegiance*. It differs from natural allegiance chiefly in this, that whereas natural allegiance is perpetual, and unaffected by change of residence, local allegiance ceases when a stranger transfers himself to another kingdom.

ALLEGIANCE. In 1792 and 1793, in consequence of the influx of foreigners caused by the Revolution, the Alien Acts were passed, conferring on the crown the power of banishing aliens from the realm. They were superseded by the Peace Alien Act, 1836.

Changes extending the power of aliens to hold property were introduced in 1844-47; and the whole legislation regarding aliens was revised and placed on its present footing by the Naturalisation Act of 1870 (33 Vict. chap. 14). By this act both real and personal property of every description, except British ships, may now be acquired, held, and disposed of, by an alien, in the same manner, in all respects, as by a natural-born British subject. An alien is not qualified for any office or municipal, parliamentary, or other franchise, unless naturalised in accordance with the provisions of the act. Every alien who has resided in the United Kingdom or served the British crown for five years, may apply to the Home Secretary for a certificate of naturalisation; and on obtaining it, he becomes in all respects as a natural-born British subject, except that in his old home he may not be deemed a British subject, unless by law or treaty to that effect. Where a convention has been entered into with a foreign state to the effect that the subjects, or citizens, of that state, who have been naturalised as British subjects, may divest themselves of such status, any person, originally a citizen of the state with which the convention exists, may make a declaration of alienage, and on so doing he shall

be regarded as an alien, and subject of the state to which he originally belonged. The privilege of aliens of being tried by a jury *de medietate linguae* is abolished, and it is provided that henceforth they shall be tried in the same manner as natural-born subjects. On the subject of expatriation, it is enacted that any British subject who has at any time before, or may at any time after the passing of this act, when in a foreign state and not under any disability, voluntarily become naturalised in such state, shall thenceforth cease to be a British subject. In the case of a British subject, who before the passing of the act has been naturalised in a foreign state, desiring to retain his British nationality, he may do so by making a declaration and taking the oath of allegiance. Whilst resident within the limits of the foreign state, however, he shall not be deemed a British subject unless he has ceased to be a subject of that state. On naturalisation and the resumption of British nationality, see NATURALISATION.

In the United States, as in England, children born out of the country are not aliens if their fathers are citizens. The alien, though not admitted to the same political and municipal rights as the citizen, is protected in person and property against wrong. But, by an Act approved 3d March 1887, it is provided that individual aliens, corporations not created by and under the laws of the United States or of some state or territory, and corporations more than 20 per cent. of the stock of which may be owned by persons not citizens of the United States, shall not hereafter acquire, hold, or own real estate so hereafter acquired, or any interest therein, in any of the territories of the United States or in the district of Columbia. It is also provided that no corporations, other than railway, canal, or turnpike companies, shall acquire, hold, or own more than 5000 acres of land in any of the territories. As since interpreted by the Attorney-general, however, this Act does not divest any rights already existing, nor does it apply to *bona fide* leases, or to personal contracts to work mines.

Aligarh (sometimes *Allaghar*), a fort in the district of the same name in the North-west Provinces of India. It lies on the road and railway between Agra and Delhi, 55 miles N. of the former place. It was stormed by the British in 1803, being then the principal depot of the French general acting for Sindhu. Ten days after the outbreak at Meerut in 1857, the native troops in garrison mutinied; and the loss of the place almost cut off the communications between the south-east and the north-west. The fort and civil station of Aligarh, along with the prosperous native city of Koil, form a municipality called Aligarh, with a pop. of 60,000, of whom 40,000 are Hindus. The district of Aligarh has an area of 1950 sq. m.; pop. (1881) 1,021,187.

Alima (*Kunja*), a tributary of the Congo, to which it joins on the right bank. Its course is mainly westwards from its source in the neighbourhood of the Ogowe springs. Its course was first traced by Balloy in 1878, and De Brazza founded two stations on its banks. From the French settlements down, the stream is navigable for steamers.

Aliment, in the law of France and in that of Scotland, has retained the meaning which it possessed in the Roman law (*Dig.* 34, 1, 6), and signifies the food, dwelling, clothing, and other things necessary to the support of life, or such money as may be judicially demanded in lieu of them. Fathers are liable to aliment children so long as the latter are unable to support themselves; and in the higher ranks still longer, if the child be destitute, especially in the case

of daughters. The obligation extends to a son's wife in the higher ranks during the son's life. The duty devolves on the father's representatives, and also on the mother, if the father be indigent or dead. The grandfather must alimnt his destitute grandchildren. The obligation in every case is satisfied by a bare subsistence, although this may vary slightly according to the social position of the parties. Children are liable to alimnt indigent parents. A husband is liable to alimnt his wife, and also his wife's indigent parents during the marriage; but in the case of both wife and child, it is enough to offer them a home. The liability to alimnt a wife is not terminated by a judicial separation, but only by divorce. Persons unable to support themselves, through age, or bodily or mental disease, are entitled to relief under the poor-law, but this alimnt may be recovered from the pauper's relatives. Money may be settled in trust for the alimnt of persons, so as to exclude the diligence of creditors.

Alimentary Canal is the name given to the principal part of the digestive apparatus. It extends from the mouth to the anus, having, in man, an average length of about thirty feet, i.e. five or six times as long as the body. Passing through the head and chest, it includes the *teeth*, the organs of mastication; the *salivary glands*, the organs of insalivation; the *tongue, pharynx, œsophagus* or gullet, the organs of deglutition. In the abdomen and pelvis, there are the *stomach*, and *small and large intestine*. Intimately concerned in the process of digestion, there are numerous small glands situate in the lining membrane of the canal, besides such large ones as the *salivary glands*, the *liver* and *pancreas*, which pour their secretions into the interior of the canal by ducts opening upon its inner surface. The various portions of this canal are treated in separate articles; see especially DIGESTION (ORGANS OF).

Alimony signifies, in English law, the allowance which a married woman is entitled to receive out of her husband's estate, *pendant lite*, or after decree of judicial separation, or for dissolution of the marriage. In the case of separation, the court can only increase, and not diminish, money previously secured to the wife; in the case of divorce, they can deal with the settlements. Alimony is sometimes called maintenance. In the United States, as in England, it is fixed by the court, and is generally proportioned to the standing and mode of life of the parties. When the wrongful cause of separation is in the wife, she is not allowed permanent alimony.

Aliquot Part. One quantity or number is said to be an aliquot part of another, when it is contained in this other an exact number of times without remainder. Thus 2, $2\frac{1}{2}$, 4, and 5 are aliquot parts of 20, being contained in it 10, 8, 5, and 4 times respectively. The consideration of aliquot parts is of great importance in the arithmetical rule of *Practice*.

Alisma-cer, a small order of monocotyledonous plants, interesting on account of its remarkable affinities to the dicotyledons, through Ranunculaceæ. It contains about ten widely distributed genera of herbaceous plants, usually growing in water or even floating. The fleshy rhizome of the water-plumain (*Alisma plantago*), common in Britain, is sometimes used as food in Eastern Russia. See also ARROWHEAD (*Sagittaria*).

Alison, ARCHIBALD, born at Edinburgh in 1757, studied at Glasgow University, and Balliol College, Oxford, and in 1781 received Anglican ord. s. He had held several preferments, including a prebend of Salisbury, and the perpetual curacy of Kenley, in Shropshire, when in 1800 he removed

to Edinburgh, and served there as an Episcopal minister till 1831. He died 17th May 1839. Alison was best known by his *Essays on the Nature and Principles of Taste* (1790), whose second edition, in 1811, gave occasion to an admiring article by Jeffrey, in the *Edinburgh Review*. They advocate the 'association' theory of the sublime and beautiful, and are written much in the style of Blair, as are also 2 vols. of Alison's *Sermons* (1814-15). - His son, WILLIAM PULTENEY ALISON, born in 1790, was professor of the institutes of medicine in the university of Edinburgh from 1822 to 1856. In 1840 he published a pamphlet to show how the inadequate provision for the poor in Scotland led to desolating epidemics; and he was also author of a dozen other medical and miscellaneous works. He died September 1859. - A younger son was SIR ARCHIBALD ALISON, the historian. Born at Kenley, Shropshire, in 1792, he entered Edinburgh University in 1805, and in 1814 was called to the Scottish bar. Three years after, he was making £600 a year, and this large income allowed him to form a fine library, and make four continental tours, till, in 1822, he was appointed advocate-depute, an office he held till 1830. He now began to appear as a writer on law, politics, and literature. His *Principles of the Criminal Law of Scotland* (2 vols. 1832-33) is still a standard authority. In 1834 Sir Robert Peel appointed him sheriff of Lanarkshire, and thenceforth he resided at Possil House, Glasgow. In 1845 he was elected Lord Rector of Marischal College, Aberdeen; of Glasgow University in 1851; and a baronetcy was conferred on him in 1852. He died 23d May 1867. His *History of Europe during the French Revolution* (10 vols. 1833-42) narrates the events from 1789 to 1815, and was continued under the title of *The History of Europe from the Fall of Napoleon to the Accession of Louis Napoleon* (9 vols. 1852-59). He also published *Lives of Marlborough, Castlereagh, and Sir Charles Stewart*, *The Principles of Population, Free Trade and Protection, England in 1815 and 1851*, &c., besides contributing for many years to *Blackwood's Magazine* a series of tedious articles on Tory politics. It is difficult to characterise Sir Archibald's *magnum opus*, *The History of Europe*. Designed 'to prove that Providence was on the side of the Tories,' it is a work of immense industry, or respectable accuracy, of occasional animation, and very tolerable candour; but its style is excessively wordy, and even when animated, is never picturesque. Neither has he much insight into events or characters. Nevertheless, as his work supplied a felt want, and is sufficiently entertaining for a large class of readers, it met with an excessive popularity. It has gone through numerous editions, and has been translated into German, French, Arabic, and other languages. See Sir Archibald's Autobiography (2 vols. 1883). His son, SIR ARCHIBALD ALISON, K.C.B., born at Edinburgh in 1826, was educated at Glasgow and Edinburgh universities, and entered the army in 1846. He served in the Crimean war; the Indian Mutiny, losing his left arm at the relief of Lucknow; the Ashanti expedition; and the Egyptian campaign, leading the Highland brigade at the battle of Tel-el-Kebir. He was gazetted lieutenant-general in 1882, and next year was appointed to the command at Aldershot. He is author of a treatise *On Army Organisation* (1869).

Aliwal, a Punjab village on the left bank of the Sutlej, 9 miles W. of Lodiana. It was the scene of a fierce conflict between the British and Sikh forces, 28th June 1846. The Sikhs had crossed the river, when they were attacked by Sir Harry Smith, defeated, and driven back with great slaughter. The victory of Aliwal was 'without a fault.'

Alizarin, the colouring matter used in the dyeing of Turkey red, exists in the madder root as a glucoside, which, when boiled with acids or alkalis, gives glucose and alizarin. But in 1869 Græbe and Liebermann discovered a method of manufacturing it from the coal-tar product anthracene; this synthesis being the first instance of the artificial production of a natural colouring matter. The manufacture of alizarin is now one of the most important branches of the coal-tar colouring industry, and threatens to put an end to the growing of madder root. For the ten years preceding this discovery, the annual imports of madder into Britain averaged over £1,000,000; ten years later, they had sunk to £24,000. The 14,000 tons of alizarin produced in 1880 were reckoned equal in colouring power to 126,000 tons of madder. The value of the former was £1,568,000; that of the madder would have been £5,670,000; that is, the artificial dye costs less than a third of the price of the natural. But the artificial dye is inferior to the natural in permanence. Alizarin is represented by the formula, $C_{14}H_6O_2(OH)_2$. See ANTHRACENE.

Alkahest, or **ALCAHEST**, the universal solvent of the alchemists. See ALCHEMY.

Alkalies. The word *alkali* is of Arabic origin, *kali* being the name of the plant from the ashes of which an alkaline substance was first procured. The name now denotes a class of substances having similar properties. The alkalies proper are four in number—potash, soda, lithia, and ammonia. The first three are oxides of metals; the last is a compound of nitrogen, hydrogen, and oxygen, and, being in the form of a gas, is called the volatile alkali. Potash, being largely present in the ashes of plants, is called the vegetable alkali; and soda, predominating in the mineral kingdom, is designated the mineral alkali. The *alkaline earths*, as they are called, lime, magnesia, baryta, and strontia are distinguished from the former by their carbonates not being soluble in water. The distinguishing property of alkalies is that of turning vegetable colours green, and vegetable yellows reddish brown. Blues reddened by an acid are restored by an alkali. The alkalies have great affinity for acids, and combine with them, forming salts, in which the peculiar qualities of both alkali and acid are generally destroyed. In this state they are said to neutralise one another. In a pure state, alkalies are extremely caustic, and act as corrosive poisons. Combined with carbonic acid, especially as bicarbonates, they are used to correct acidity in the stomach; but the injudicious and continued use of them is attended with great evil. The alkalies and some of their salts (e.g. citrates, tartrates) are also used to increase the secretion of urine, and (ammonia excepted) to diminish its acidity. Ammonia in small doses is a powerful stimulant. An account of the several alkalies will be found under the heads of POTASH, SODA, LITHIA, and AMMONIA, and of the alkaline earths, under LIME, MAGNESIA, BARYTA, and STRONTIA.

Alkalimetry. Commercial potash and soda always contain greater or less quantities of foreign substances, such as sulphate of potash, common salt, silicates, oxide of iron, water, &c. which diminish the percentage of real alkali in a given weight. It is important, then, for the manufacturer to have some simple and ready means of determining the proportion of pure carbonate of potash or soda contained in any sample, that he may be able to judge of its value. Ordinary chemical analysis takes too much time. The alkalimeter serves this purpose. It consists of a graduated glass tube, filled with diluted sulphuric acid, and containing as much absolute sulphuric acid as would neutralise a given weight, say 100 grains, of carbonate of potash. 100

grains of the article to be judged of is then dissolved in water, and as much acid is gradually added to it from the tube as to neutralise the solution, that is, take up all the alkali. The purer the article, the more of the acid will be required; and if the tube, which is divided into 100 degrees, has been emptied to the 80°, the impure article contains 80 per cent. of pure carbonate of potash. The point at which neutralisation is complete is determined by means of coloured tests. Formerly, the two vegetable colours, litmus and turmeric, were alone used for this purpose, addition of an alkali rendering litmus blue and turmeric reddish brown; while under the influence of acids the former changes to a red, the latter to a yellow (red in the case of boric acid). It is not, however, always easy to recognise the neutral point, and other *indicators* (as these colouring matters are called) have come into use. The chief of these are methyl-orange and phenolphthalein. A mixture of the alcoholic solutions of these substances imparts a pale yellow colour to strictly neutral liquids, which is changed to deep red by the least trace of alkali, and to pink by a trace of acid.

This method of determining the strength of alkalies is called the *alkalimetric process*; but the alkalimeter is not confined in its use to the estimation of the strength of alkaline substances. It is likewise employed in the determination of the strength of acids, such as sulphuric acid, hydrochloric acid, nitric acid, and acetic acid (vinegar). For this end, the graduated instrument is charged with a solution of an alkali of known strength, such as a given weight of crystallised carbonate of soda (washing soda), dissolved in water, and according to the number or divisions of the liquid poured from the alkalimeter, the strength of the acid into which the alkaline liquid has been decanted is calculated. The latter application of this instrument is called *acidimetry*. Again, the same graduated glass tube has been recently employed in many other ways, such as the determination of the strength of a solution of silver, by charging the instrument with a known or standard solution of common salt; and for this purpose it is used largely by the assayers of the Royal Mint, and other metallurgic chemists. This mode of analysis is every day becoming of more and more importance, and, in fact, has given rise to a new department of analytical chemistry, which has been designated *analytical alchemy*.

Alkaloids form an important class of substances discovered by modern chemistry. They are divided into two classes, namely, *natural* and *artificial*. The natural alkaloids are found in plants and animals, and are often designated *organic bases*. Those obtained from plants are frequently their *active principles*; but it must not therefore be assumed that when a plant contains an alkaloid it is of necessity the active principle, which may rather be a resin, glucoside, volatile oil, or vegetable acid. Most of the natural alkaloids consist of carbon, hydrogen, nitrogen, and oxygen, and are solid bodies at the ordinary temperature. A few, however, only contain carbon, hydrogen, and nitrogen, and these are for the most part liquids which can be distilled without decomposition. The more important of this class are cocaine and nicotine. The alkaloids have generally an energetic action on the animal system, and hence are every day employed in small doses as medicine; whilst in comparatively large doses they are powerful poisons. Many of them have an alkaline reaction on vegetable colours, and are hence termed *vegetable alkalies*; but in the greater number this property is only possessed in a very faint degree, and it is by analogies, based on other properties, that they are all classed under one title. There is only one

property common to all alkaloids, natural and artificial—namely, that they combine directly with acids to form more or less stable salts, capable of undergoing double decomposition; as, for example, sulphate of quinine, muriate of morphine, &c. Most of the alkaloids have an acrid, bitter taste, and are sparingly soluble in water, more freely so in alcohol. To describe the methods of obtaining alkaloids from plants or animal matters would be beyond the scope of this article; but, in general, it may be stated that they are precipitated from solutions by tannin, and the double iodides of potassium and mercury, or cadmium and bismuth; and by treating these precipitates with an alkali, the bases may be obtained. The following list contains the names of the chief alkaloids, with the plants from which they are obtained:

Alkaloid.	Source.	Alkaloid.	Source.
Aconitine....	Aconite.	Hyoscyamine	Henbane.
Angosturine...	Cuscuta.	Jervine	Helichrysum.
Atropine....	Belladonna.	Lupuline	Hops.
Belladonnine	Belladonna.	Morphine	
Boheerine....	Boheer Tree.	Codamine	Opium.
Borberine....	Berberis.	Narcotine	
	Columba.	Nicotine	Tobacco.
Cocaine....	Coca Leaf.	Pilocarpine	Jaborandi.
Coniine....	Hemlock.	Piperine	Black Pepper.
Curarine....	Arrow Poise.	Quinine	
Cytisine....	Bio.	Cinchonine	Cinchona.
Laburnine		Cinchocaine	
Daturine....	Stamaine.	Sassafras	Mustard.
Delphinine	Stavacere.		
Ergotamine....	Ergot.	Bracon	Nux Vom.
Escutrine or		Veratrin	Coca-bill.
Physostig-			
mine	Calabar Bean.		

The number of animal alkaloids which has been examined is small, the better known ones being urea, found in the urine of the mammalia, and kreatine and kreatinine, two of the constituents of the juice of flesh. Besides these, however, there are many substances, answering to the alkaloidal tests, which are found in flesh, both in the fresh and putrefied state, and which are classed under the title *Proteins* (q.v.).

The artificial alkaloids are those organic bases which are not found in any known plant or animal, but of which the later researches of chemists have contrived to form a large number. As the artificial alkaloids do not differ from the natural alkaloids in composition, structure, or properties, it is confidently believed that the day is not far distant when all of the alkaloids will be prepared artificially; indeed, recently, several of the natural alkaloids have been manufactured on the small scale without the intervention of the living plant or animal. For instance, urea can be formed by heating carbonate of ammonia to 284° F. (140° C.) in a sealed tube, while coniine, the alkaloid of hemlock, has been prepared artificially by a German chemist. Hitherto, the more important alkaloids—quinine, morphine, &c.—have defied all attempts at artificial production.

The following remarks on the artificial alkaloids refer (1) to the classification of organic bases, and (2) to their formation.

(1) From the fact that nearly all artificial organic bases are (as will be afterwards shown) actually constructed from ammonia, and that, whether artificially or naturally formed, they exhibit the property of basicity, which is a leading characteristic of ammonia, chemists have been led to refer organic bases generally to the typical body ammonia, and to regard them as being constructed upon it, or derived from the simple type NH_3 . Berzelius believed that all the alkaloids actually contained ammonia as an ingredient of their composition, a view which is now unacceptable; and it is to Liebig that we are indebted for the idea that they are derivatives of ammonia, or, in other words, amide bases or ammonia in which an equivalent of hydrogen is

replaced by an organic radical. These bases are classified under the general term *amines*—the word *amines* being applied to all organic bases that are derived from ammonia (NH_3). The amines may be (1) *monamines*, (2) *diamines*, (3) *triamines*, (4) *tetramines*, or (5) *pentamines*, according as they are constructed upon a single, double, treble, quadruple, or quintuple atom of NH_3 . We shall confine our illustrations of the meaning of these terms to the monamines, both because they form the most important group, and because they are much more readily elucidated than the other groups, which are extremely complicated in their composition. *Monamines* are constructed upon the simple type of ammonia, H_3N . In *primary monamines* one of the atoms of hydrogen is replaced by an organic radical, R; and hence their general formula is RH_2N . Ethyl-amine (C_2H_5) H_2N , or $\text{C}_2\text{H}_5\text{N}$, is an example. In *secondary monamines* two of the atoms of hydrogen are replaced by two atoms of either the same or of different radicals. Hence their general formula is $\text{RR}'\text{HN}$, where R and R' may be the same or different radicals. (C_2H_5) H_2N , diethyl amine, and (CH_3)(C_2H_5) HN , are examples of these. In *tertiary monamines* the three atoms of hydrogen are replaced by three atoms of the same or different radicals; their formula therefore is $\text{RR}'\text{R}''\text{N}$, when R, R', R'' may or may not differ from one another. Trimethyl amine (CH_3) H_3N , and ethyl-ethyl phenyl-amine (CH_3)(C_2H_5)(C_6H_5) N , afford examples of the radicals being all the same, and of their being all different.

(2) Although all attempts at forming in the laboratory those alkaloids that naturally exist in plants, such as morphia, quinia, and strychnia, have hitherto failed, a large number of organic bases have been prepared by artificial means, such as: *a.* By the destructive distillation of organic bodies containing nitrogen. Thus, in the preparation of coal gas, four at least of these compounds are obtained—viz., aniline, picoline, benzol (or quinoline), and pyridine. *b.* By the distillation of certain nitrogenous compounds with caustic potash. In this way aniline is obtained from indigo. *c.* By the combination of ammonia with the aldehydes and with certain volatile oils which possess the properties of aldehydes. Thus acetic aldehyde yields dimethyl amine, and oil of mustard yields thiosinamine. *d.* By the substitution (by the action of strong nitric acid) of one molecule of nitrous acid, NO_2 , for one atom of hydrogen in certain hydrocarbons. *e.* By the processes of fermentation and putrefaction. Thus wheat flour yields by putrefaction trimethyl-amine, ethyl amine, and amyl amine.

Alkanet (*Anchusa tinctoria*, to which the name Alkanet or Alkanna Arabic (*Al-chench* more strictly belongs) is a native of the Levant and of the south of Europe, extending as far north as Hungary. The root is sold under the name of alkanet or al-chench-root, and is imported from the Levant. It appears in commerce in brittle pieces of the thickness of a quill or of the finger, the end blackish externally, but internally dark red. It is sometimes adulterated with dyed roots of common alkanet (*Anchusa officinalis*). The root of *Lawsonia inermis*, a Lythraceous plant, was formerly often imported under the same name. Alkanet-root contains a resinous red-colouring matter, called *Alkanna Red* (*Alkannin* or *Anchusin*). The colour which it yields is very beautiful, but not very durable. It is readily soluble in oils and alcohol, and is therefore in very general use as an orange perfumers for colouring oils, soaps, pomades, lip salves, &c., and in the composition of stains and varnishes. The name of alkanet is also extended to the whole genus *Anchusa*, of which three species are common in Britain.

Alkan'na. See HENNA.

Alkmaar, an old town of the Netherlands, on the North Holland Canal, 19 miles N. by W. of Amsterdam by rail. It is well built, has very clean streets, and is intersected by broad canals. It possesses a Gothic town-house; the church of St Lawrence dates from the 15th century. Alkmaar has manufactures of sail-cloth, sea-salt, soap, vinegar, and leather, and trade in cattle, grain, butter, and excellent cheese - of which it exports enormous quantities. Alkmaar held out against the Duke of Alba, who besieged it in 1573. Here, on October 18, 1799, the Duke of York signed a not very honourable capitulation. Pop. (1883) 14,048.

Alkoran. See KORAN.

Allah (compounded of the article *al* and *ilāh* i.e. 'the god,' a word cognate with the Hebrew *Elodh*), the Arabic name of the supreme god amongst the heathen Arabs, adopted by Mohammed for the one true God. See MOHAMMED, MOHAMMEDANISM.

Allahabad ('city of God'), the seat of the government of the North-west Provinces of British India, occupies the fork of the Ganges and Jumna, thus forming the lowest extremity of the *Doab*, or the country of *Two Rivers*, 390 miles S.E. of Delhi. The situation of Allahabad, at the confluence of the holy streams of India, besides giving the city its sacred appellation, has rendered it a much-frequented place of pilgrimage for the purposes of religious ablution. With the exception of a few ancient monuments of elaborate and tasteful workmanship, the native part of the city consists of mean houses and narrow streets; the European quarter is vastly superior. The nucleus of the city appear to have been the native fort, which, on the east and south, rises directly from the banks of both rivers, while towards the land its artificial defences are of great strength. The Europeans of the garrison occupy well-constructed barracks. Beyond the fort are the cantonments for the native troops. There are numerous handsome villas and bungalows, rendered still more attractive and agreeable by avenues of trees.

A stronghold has existed at the junction of the rivers from the earliest times, but the present fort and city were founded by Akbar in 1575. The Mahrattas held Allahabad from 1736 till 1750; the city and district were ceded to the British in 1801. On the 6th of June 1857, the insurrection, which had begun at Meerut on 10th May, extended to Allahabad. Though the Europeans continued to hold the fort, yet the mutineers were, for some days, undisputed masters of all beyond; and between the ravages of the marauders and the fire of the garrison, the city soon became little better than a heap of blackened ruins. General Neill arrived on the 11th, and recovered Allahabad on the 18th; Havelock arrived shortly afterwards.

The position of Allahabad renders it naturally a centre of commerce and civilisation. It commands the navigation both of the Ganges and of the Jumna. It is on the direct water route between Calcutta and the Upper Provinces; and is a main station, not only on the Grand Trunk Road, but also on the East Indian Railway. The most noteworthy buildings are the great mosque and the Sultan Khosrow's caravanserai; a fine cloistered quadrangle. The fort is of red stone, and is approached by a very handsome gate: it contains the famous pillar of Asoka (249 B.C.). Near by is the temple covering the undying banian tree; it is said to communicate with Benares by a subterranean passage, through which flows a third holy river, the Saraswati, visible only to the eye of faith. Allahabad possesses the gov-

ernment offices and courts, Roman Catholic cathedral, Mayo Memorial and town hall, a free public library, an institute, post and telegraph offices, an hospital, theatres, bazaars, &c. The Muir Central College, instituted by Sir W. Muir, was opened in 1886; and a bill for a university was brought forward in the summer of 1887. A great fair is held annually in December and January on the plain below the fort, which lasts for a month, and is visited by about 250,000 persons. The cotton, sugar, and indigo produce of the fertile district of Allahabad is brought in large quantities into the city. There is a good local trade in gold and silver ornaments, and in European furniture. Allahabad is distant from Calcutta, by land, 564 miles, and 89 from Benares. Pop. (1872) 143,693; (1881) 148,547, of whom 99,518 were Hindus, and 43,558 Mohammedans.

ALLAHABAD district is 85 miles in length by 50 in breadth; area, 2833 sq. m. The district is mainly agricultural, is well watered, and vegetation is luxuriant. The population in 1881 was 1,474,106, almost wholly Hindus; the Mohammedans being about 200,000. The 'division' of Allahabad has an area of 13,746 sq. m. Pop. (1881) 5,754,855. It comprises one of the most populous and productive territories in India.

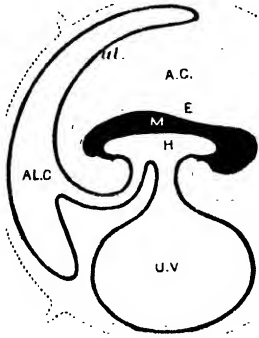
Allamanda, a tropical American genus of Apocynaceæ (q.v.), cultivated in hot-houses for the sake of its large beautiful yellow flowers. *Allamanda cathartica*, a native of the West Indies, has violently emetic and purgative properties.

Allan, DAVID, a Scottish painter, Wilkie's fore-runner, was born at Alloa in 1741. From 1755 to 1762, he studied at the academy for painting and engraving established in Glasgow by the printer Foulis; and in 1764 the liberality of friends enabled him to go to Rome, where he resided sixteen years. There in 1773 he gained the gold medal of St Luke's Academy for the best historical composition. His subject was the 'Origin of Painting, or the Corinthian Maid drawing the Shadow of her Lover.' This picture, the highest effort of Allan's powers, was engraved by Cuneo, and is now in the National Gallery at Edinburgh. In 1777 Allan came to London, where he painted portraits; in 1780 he removed to Edinburgh, and in 1786 succeeded Rumelin as the head of the art academy there. His works subsequent to this date were chiefly of a humorous description, and illustrative of Scottish domestic life. His illustrations of Allan Ramsay's *Gentle Shepherd* became very popular, but are of no great merit. He died at Edinburgh, 6th August 1796.

Allan, SIR WILLIAM, a distinguished Scottish historical painter, was born at Edinburgh in 1782, and educated at the High School. Having early displayed a taste for drawing, he was apprenticed to a coach-painter, and studied at the Trustees' Academy, with Wilkie for a fellow-pupil. He subsequently entered the schools of the Royal Academy of London, and in 1803 exhibited 'A Gipsy Boy with an Ass;' but in 1805 he set out for St Petersburg, where the friendly interest of his countryman, Sir Alexander Crichton, the imperial family physician, soon procured him employment. In the Russian capital he spent several years, making occasional tours to the south of Russia, the Crimea, Turkey, and Circassia. In 1814 he returned to Edinburgh, and next year exhibited his 'Circassian Captives,' which, thanks to Sir Walter Scott, was sold by subscription for 1600 guineas. After a severe attack of ophthalmia, he visited Italy, Turkey, Greece, and Asia Minor. In 1826 he was elected an Associate of the London Academy; in 1835, an Academician. In 1838 he became president of the Royal Scottish Academy,

and on Wilkie's death in 1841, he was knighted and appointed Limner to Her Majesty for Scotland. He died in his painting room, 22d February 1850. Though not a great painter, Allan gave such an impulse to historical painting, especially of national subjects, as entitles him to a high place in the history of Scottish art.

Allantois, a sac like fetal membrane formed in the embryos of reptiles, birds, and mammals, as an outgrowth from the posterior end of the alimentary tract, just in front of the anus. While it never really occurs in animals lower than reptiles, it may be fairly said to be represented in the fish *Lepidosiren* and in the amphibia by a urinary bladder. In all higher animals, however, it is precociously developed and modified for other purposes. It forms a large sac, enveloping the embryo outside the Amnion (q.v.). In reptiles and birds the surface is traversed by an abundant network of blood-vessels, and the important function of embryonic respiration is thus discharged. In placental



Fœtal Membranes of a Mammal :

E, embryo; M, its in-ter-mesoderm; H, gut-cavity lined by inner layer or ectoderm; U.V., umbilical vesicle; ut., allantois, with allantoic cavity, A.L.C.; am., amnion, with amniotic cavity, A.C.; am. represents the united inner portion of double folds, the outer limbs of which form the sub-zonal membrane (not lettered) under p., the zona pellucida. (From Turner.)

mammals a further functional change (see FUNCTION) is exhibited, since the allantois aids in the development of the Chorion (q.v.), which is intimately connected with the walls of the uterus, in the structure known as a *Placenta* (q.v.). The blood of the embryo is exchanged with the blood of the mother, and embryonic nutrition is thus effected. The precocious urinary bladder is thus respiratory in reptiles and birds, and nutritive in mammals. In amphibia, the allantois persists as stated; in reptiles, the stalk dilates to form the permanent bladder; in birds, the whole atrophies. In mammals, the stalk of the allantois (1) dilates to form the bladder, while the lower portion (2) narrows to form the *urethra*. The *urethra*, or stalk connecting the bladder to the ventral wall of the body, is also of allantoic origin.

Allard, JEAN FRANÇOIS, was born in 1785 and in 1815 was adjutant to Marshal Bugey (q.v.), for whose assassination he quitted France, intending to emigrate to America. Having changed his plan, he entered the service of Abbas-Mirza of Persia, and in 1820 proceeded to Lahore. There Runjeet Singh made him generalissimo of the Sikh army, which he organised and trained in the European modes of warfare. In 1823 he revisited Paris, where he was received with distinction, and was made French *chargé d'affaires* in Lahore. Returning next year to Lahore, he repeatedly distinguished himself in the subsequent battles of Runjeet Singh

with the Afghans, and died at Peshawar, January 23, 1839.

Alleghany, a river, which, rising in the north part of Pennsylvania, unites with the Monongahela at Pittsburg to form the Ohio. Though it flows through a hilly country, yet it is navigable for nearly 200 miles above Pittsburg, whence by the Ohio and the Mississippi the navigation extends to the Gulf of Mexico.

Alleghany Mountains, a term sometimes used as synonymous with the Appalachian system (see APPALACHANS), but by some writers applied only to that portion of the system which extends from Pennsylvania to North Carolina, and which forms the watershed between the Atlantic and the Mississippi. It is sometimes used in a still more restricted sense. The ridges are remarkable for their parallelism and regularity, all the main valleys being longitudinal. The general direction is nearly parallel with the Atlantic coast. Their average height in Pennsylvania and Virginia is from 2000 to 2400 feet above the sea; but their original height has been greatly reduced by denudation or erosion. They are composed of stratified rocks of the Silurian, Devonian, and Carboniferous ages. They are rich in coal, iron, and limestone, and their forests supply large quantities of valuable timber.

Allegheny, or ALLEGHANY, one of the chief manufacturing cities of Pennsylvania, situated on the Alleghany River, opposite Pittsburg, is the terminus of important railway lines, and has besides its factories numerous important public institutions, such as the Western Penitentiary, which has usually 400 to 500 inmates; and a Presbyterian theological seminary, with 5 professors and nearly 200 students. There are 3 theological schools, about 50 churches, an astronomical observatory, a city park of 100 acres, a Catholic orphanage, and a college for coloured persons. The chief industries of the place include rolling-mills for iron, cotton and woollen mills, breweries, foundries, a steel factory, blast furnace, and locomotive works. It is a favourite place of residence for the business men of Pittsburg, but though in many respects a suburb of that city, it has a separate municipal organisation. Pop. (1870) 53,180; (1880) 78,681, nearly half being Germans.

Allegiance is derived from the Old French *lige*, most probably from an Old German *ledig*, 'free'; the *ledigman*, or *ligius homo*, being the man who was free except in his obligations to his lord. Blackstone, therefore, is etymologically wrong in saying that 'Allegiance is the tie or *ligamen* which binds the subject to the sovereign, in return for that protection which the sovereign affords the subject.' Allegiance is the highest legal duty of a subject, and consequently its violation, Treason (q.v.), is the highest legal offence. Allegiance is of three kinds: (1) *Natural or implied allegiance*, which every native or naturalised citizen owes to the community to which he belongs. Independently of any express promise, every man, by availing himself of the benefits which society affords, comes under an implied obligation to defend it, and this equally whether the attack be from without or from within. In time of war, this obligation involves the duty either of bearing arms in defence of the state, or of contributing to the additional taxes and other expositions which the support of a standing army may render necessary. In peaceful times, it will be adequately fulfilled by an efficient performance of ordinary citizen duties. (2) *Express allegiance* is that obligation which arises from an expressed promise, or *oath of allegiance*. The old English oath of allegiance was first imposed by the laws of Edmund as a purely personal obligation, but at the

Council of Salisbury it was ingeniously connected with the feudal tenures then introduced. In its modern form it is still required from many public officers and from professional persons before entering on practice. The idea of political allegiance, however, is probably destined to be superseded by that of citizenship. The oath of allegiance is simply one of fidelity to the Queen and her successors, and adds nothing to natural allegiance. (3) *Local* or temporary allegiance is that obedience and temporary aid due by an Alien (q.v.) to the state or community in which he resides. Local differs from the higher kinds of allegiance in this, that it endures only so long as the alien resides within the Queen's dominions, whereas natural allegiance, whether implied or expressed, is perpetual, following not only the individual himself, but his children and grandchildren. By the provisions of the Naturalisation Act of 1870, allegiance may now be renounced, even by natural-born subjects, and this whether born within the realm or not, by a declaration of alienage (sect. 4), and it is forfeited by the acceptance of the allegiance of a foreign state (sect. 6). But the allegiance thus forfeited may be resumed. A natural-born British subject who has become an alien in pursuance of this act, may, on performing the same conditions as are required of an alien applying for a Certificate of Nationality (see NATURALISATION), apply to one of her Majesty's principal Secretaries of State for a certificate of readmission to British nationality (sect. 8). In a colony, the like powers are conferred on the Governor.

In the United States, there is no personality to whom allegiance is due; the sovereignty resides in the combined will of the people, as expressed in the constitution and laws. Allegiance is twofold: (1) to the central government, which is paramount; (2) to the state of which one is a citizen. Children of citizens of the United States born within the limits of the country, owe allegiance to the United States.

By the law of England, and agreeably to the spirit of the constitution, a usurper in undisputed possession of the crown, or king *de facto*, is entitled to allegiance, because he then represents, not the sovereign whom he has dispossessed, but the general will in which the ultimate sovereignty of England resides. The sovereign may by proclamation summon his subjects to return and take part in the defence of the kingdom, when menaced or endangered.

The papal pretensions have at various times given rise to difficulties with regard to the allegiance of Roman Catholics. The sentence of Pius V., renewed by Gregory XIII. and Sixtus V., deposing Elizabeth and releasing her subjects from obligations of allegiance, led her government, by way of precaution and retaliation, to increase the rigour of the penal laws. There was in her reign comparatively little attempt to discriminate between Catholics who accepted and those who rejected the doctrine of the deposing power. It was fairly assumed that the then dangerous tenet was held and taught by the missionary priests as a whole. Father Parsons had boldly maintained that it was an article of the Catholic faith. In 1603, however, thirteen influential priests signed and lauded to Elizabeth a protestation of allegiance drawn up by Dr William Bishop, afterwards Bishop of Chalcodon, in which they emphatically declared their readiness to defend their sovereign, in spite of all prelate and excommunications, from any attempts to put in force such sentences. The declaration came too late for Elizabeth to take action upon it. Later after the Gunpowder Plot, when parliament was enacting fresh penal statutes, James I., with a view of establishing a distinction between Catholics whose

loyalty he could depend upon and those whose opinions rendered them dangerous, and of affording some small measure of relief to the former, framed in 1607, with the assistance of Bishop Bancroft and Sir Christopher Perkins, an ex-Jesuit, the famous Oath of Allegiance, which caused confusion and division in the Roman Catholic camp for nearly a century. James's object was conciliatory, but he unwittingly, and his advisers perhaps designedly, defeated that object by the terms of the oath which required Catholics not merely to assert their own rejection of the deposing power, but to pronounce the doctrine held by many learned doctors and canonised saints of their church, to be 'impious and heretical.' The clause was impolitic. Many Catholics who would have had otherwise no difficulty in taking the oath, stopped short at this. Moreover, it enabled Pope Urban V. more easily to condemn and prohibit it, which he did in two successive briefs, without, however, in spite of the repeated entreaties of the suffering Catholics, explaining wherein it was faulty or contrary to the faith. Nevertheless the archpriest Blackwell, after consultation with his friends, took the oath and recommended the clergy and laity to do the same. Many others, both priests and laymen, including the Catholic peers almost without exception, continued to take it. Blackwell was suspended from his office, but until his death he adhered to his theological position. On the other hand, two priests under condemnation, who had signed the protestation of allegiance of 1603, and personally rejected the deposing power, declined to save their lives by taking the oath, on the ground of the pope's prohibition. James, irritated and disappointed by the action of the pope, took up his pen in defence of the oath, against Bellarmine and its assailants; and the controversy was kept up with acrimony among Catholics themselves. The chief advocate of the oath among the clergy was Father Preston, *alias* Widdrington, a Benedictine monk, and among the laity, William Howard. James II., when duke of York, took the oath, and intimated his intention of enforcing it when he came to the throne. In 1690 the form of the oath was altered in a sense hostile to Roman Catholics, and it was not until 1778 that it was freed from all objection on their part. The definition of the pope's infallibility by the Vatican Council in 1871, gave occasion to a pamphlet by Mr Gladstone, entitled *The Vatican Decrees in their bearing on Civil Allegiance* (1874), which once more revived an active controversy on 'divided allegiance,' in which Cardinal Manning, Dr Newman, and Monsignor Capel took a conspicuous part.

Allegory (Gr., made up of *allos*, 'other,' and *agoraa*, 'speaking'), a figurative representation, in which properties attributed to the apparent subject really refer to another subject not named but intended to be understood. It is thus a continued or extended metaphor, a concrete narrative or picture intended to suggest an abstract truth or doctrine. It is supposed to be a figurative application of real facts. The New Testament *parable* is a short allegory, marked by simplicity and brevity, and with one definite moral; the classical *fable* is a short story, differing from the allegory only in not being necessarily probable in its incidents. Allegory differs from metaphor chiefly in its being longer sustained, and more fully carried out in its details: while metaphor is confined to a single expression or at most to a sentence, it is carried through the whole representation. It is not abstract ideas alone that are adapted to allegorical treatment; not only may virtue and vice, for instance, be personified and treated allegorically, but real persons may be represented by allegorical persons. Nor is language alone the medium of

allegory; it may be addressed to the eye, and is often exhibited in painting, sculpture, or the actor's art.

We find allegory in use from the earliest ages. Orientals are specially fond of it. As examples from antiquity may be cited the comparison of Israel to a vine in the 80th Psalm; the beautiful passage in Plato's *Phædrus*, where the soul is compared to a chariot drawn by two horses, one white and one black; the description of Fame in the fourth book of the *Æneid*. Bunyan's *Pilgrim's Progress* is perhaps the most complete; Spenser's *Fæerie Queene*, Swift's *Tale of a Tub*, Addison's 'Vision of Mirza' in the *Spectator*, and Thomson's *Castle of Indulgence*, are well-known examples of the allegory.

ALLEGORICAL INTERPRETATION is that kind of interpretation by which the literal significance of a passage is either transcended or set aside, and a more spiritual and profound meaning elicited than is contained in the form or letter. The apostle Paul himself allegorises, or, at least, interprets spiritually the history of the free-born Isaac and the slave-born Ishmael (Gal. iv. 21). Allegorical interpretation with reference to the Old Testament, was most extensively employed by Philo Judæus, a philosophical Jew of Alexandria, and a contemporary of Jesus. His writings stimulated the allegorising tendencies of the Alexandrian school of Christian theologians, the most famous of whom are Clemens Alexandrinus and Origen. The latter went so far as to say that 'the Scriptures are of little use to those who understand them as they are written'. Thus he maintained that the Mosaic account of the Garden of Eden was allegorical; that Paradise only symbolised a high primeval spirituality; and that the expulsion from the Garden lay in the soul's being driven out of its region of original purity. The Neo Platonists allegorised the Jewish myths.

Allegro (It., 'lively'), the fourth of the five principal degrees of movement in music, implying that the piece is to be performed in a quick or lively style. Allegro, like all the other degrees of movement, is often modified by other terms, such as *allegro non tanto*, *allegro ma non troppo*, *allegro moderato*, *mozzoso*, *maestoso*, *commodo*, *cicace*, *assai*, *di meno*, *con fine*, &c. As a substantive, allegro is used as the name of a whole piece of music, or a movement (usually the first) of a symphony, sonata, or quartet.

Alleine, JOSEPH, next to Baxter the most widely read of the Puritan writers, was born at Devizes early in 1634. He was educated at Lincoln and Corpus Christi colleges, Oxford, where he was noted for the severity of his studies, and was ordained in 1654. He began his ministry at Taunton in the same year, and laboured here until his ejection with the two thousand in 1662. Together with the grandfather of the Wesleys, he now became an itinerant preacher, and was in consequence frequently fined and imprisoned. His last years were dark and troubled, but death brought him relief, 17th November 1668. He was buried according to his wish in the chancel of his old church at Taunton. His *Alarm to the Unconverted*, of which 20,000 copies were sold at once on its appearance (1672), and 50,000 on its republication under a new title three years later, is still deservedly read. His interesting *Remains* were published in 1674.

Alleluia. See HALLELUJAH.

Allemande is a German national dance (hence the French name, meaning 'German'), originally Swedish, in various kinds of waltz tempo. It was introduced into France in the time of Louis XIV., and became extremely popular on the stage under Napoleon I. The name has also been used for an

orchestral composition in slow and measured time, not for dancing.

Allen, BOG OF, a general name applied to a series of morasses east of the Shannon, in King's County and Kildare, Ireland, comprising about 150,000 acres. The strips of arable land which intersect this bog are watered by fens, such as the Barrow, Boyne, and Brosna; the Grand Canal also passes through the bog. The average elevation of the morasses is 250 feet above the sea-level. Lough Allen, in Leitrim, is a lake on the upper course of the Shannon (q.v.), and has an area of 8900 acres.

Allen, CHARLES GRANT, novelist and versatile writer, born at Kingston, Canada, February 24, 1848, was educated at Merton College, Oxford, and graduated in 1870. Since adopting a literary career he has contributed largely to periodicals, and amongst other books has published *Physiological Esthetics* (1877); *Colour Sense: Evolutionist at Large: Vignettes from Nature: Flowers and their Pedigrees: Charles Darwin* (1885); and several clever novels, including *Babylon*, and *In All Shades* (1886).

Allen, ETHAN, born at Litchfield, Connecticut, in 1738, distinguished himself early in the revolutionary war by the surprise and capture of Fort Ticonderoga (10th May 1775). He next did good service in Montgomery's expedition to Canada, but was taken prisoner, and not exchanged till 1778. He was afterwards a member of the Vermont legislature, and died 13th February 1789. He was author of a deistical work, *Reason the only Oracle of Man* (1784). See his Life by De Puy (1853).

Allen, JOEL ASAPH, American zoologist, born at Springfield, Massachusetts, in 1838, accompanied Agassiz to Brazil in 1865, and in 1885 was appointed curator of ornithology and mammalogy in the New York Museum, after holding a similar office at Cambridge. He is author of monographs on the buffalo, pinnipeds, rodentia, &c., of high scientific and literary value.

Allen, JOHN, was born at Redford, in Colinton parish, near Edinburgh, in 1771, and in 1791 became M.D. of Edinburgh University. He translated Cuvier's *Introduction to the Study of the Animal Economy* (1801), and soon after, with Lord and Lady Holland, set out on a tour through France and Spain, where they resided till 1805. Thenceforward he was a constant *habitué* of Holland House. He contributed upwards of forty articles to the *Edinburgh Review*. His most valuable work is his *Inquiry into the Rise and Growth of the Royal Prerogative in England* (1830). He was warden of Dulwich College (1811-20), and then its master until his death on 10th April 1843.

Allen, WILLIAM, Cardinal, was born of gentle parentage at Rossall, Lancashire, in 1532, and in 1547 entered Oriel College, Oxford, of which, in 1550, he was elected fellow. In 1556 he became principal of St Mary's Hall, and Catholic though he was, he retained this office till 1560, or was it till the following year that he had to seek refuge in Flanders. Even then he stole back home in 1562, that his native air might cure a wasting sickness; but when, in 1565, he landed once more in the Low Countries, it was never to return to England. He received priest's orders at Mechlin, in 1567 made a pilgrimage to Rome, in 1568 founded the English college at Douay (q.v.), and in 1587 was created a cardinal during his fourth visit to Rome. He never afterwards quitted the imperial city, dying there on 16th October 1594. At the time of the Armada, Allen signed, if he did not pen, the *Admonition to the People of England*, in which he declared Elizabeth to be deposed, and urged the Catholics

to take up arms against her. He possessed, in addition to moral and intellectual gifts of a high order, a remarkable personal influence, which made him as long as he lived the unrivalled leader of his co-religionists. The decadence of the Catholic cause dates from his death. But his colleague at Douay was perhaps the chief means of preserving the Catholic faith from being so utterly destroyed in England as it was in the northern kingdoms of the Continent. He wrote several works on the religious and political controversies of his time, the chief of which are his *Apology for the Seminars* (1581), described by Bolton as 'a princely, grave, and flourishing piece of natural and exquisite English,' and a *Modest Defence of English Catholics*, in answer to Cecil's *Execution of Justice*. His *Letters and Memorials* have been edited by Fathers of the Oratory, with an historical introduction by Dr Knox (1882).

Allentown, a manufacturing town of Pennsylvania, U.S., in a fertile district on the Lehigh River, 60 miles NW. of Philadelphia by rail. The Lehigh Valley is rich in iron ore and anthracite coal; large blast furnaces, iron works, and rolling-mills are in operation in the neighbourhood; and there are manufactures of furniture and linen thread. The streets are lighted by naphtha and electricity. The inhabitants are mostly of German descent. Allentown possesses a Lutheran college, a female college, an academy, a military institute, and a Lutheran seminary. Pop. (1860) 8025; (1880) 18,063.

Alleppi. See AULAPOLAI.

Allerion, in Heraldry, an eagle with expanded wings, but without beak or feet. The best known examples of it are in the arms of the duchy of Lorraine, and of the family of Montmorency. In the earlier heraldry it has both beak and claws, and is described as a bird species of eagle.

Alleyne, EDWARD, a famous actor, contemporary with Shakespeare, was born in 1566, and died in 1626. His connection with the English stage during the period of its highest prosperity, invests his life with interest to the student of the drama; but it is as the munificent and pious founder of Dulwich College (q.v.) that he principally claims the remembrance of posterity. The building of the college was begun in 1613, and in 1619 the institution obtained the royal charter, after some obstruction on the part of Lord Bacon, who wished the king to apply part of the grant to the foundation of two lectureships at Oxford and Cambridge. Alleyne himself and his wife took up quarters in the college, living on equal terms with the scholars of his bounty. See his *Memoirs* by C. Lier (1841); Collier's *Alleyne Papers* (1843); and Warner's *MSS. of Dulwich College* (1881).

All-Fools' Day. See APRIL.

Allia (more correctly, *Alia*), a small stream in ancient Latium, which fell into the Tiber, 11 miles N. of Rome. It was the scene of the defeat of the Roman army by the Gauls under Brennus in 387, or, according to others, 390 B.C.

Alliaceous Plants are primarily those of the genus *Allium* (Onion, Leek, Shallot, Garlic, Ransons, Rocambole), or others nearly allied to it. The term is, however, extended to denote the possession of the characteristic odour and taste (due to the presence of an essential oil) presented in varying degrees by all members of that important genus. Thus the alliaceous flavour and odour are strongly developed in plants belonging to very different orders: e.g. the common treacle mustard (*Alharia officinalis*, natural order Cruciferae); while certain species of Meliaceae are used as garlic in Java.

Alliance, a compact between independent families or nations. See TREATY, HOLY ALLIANCE, TRIPLE ALLIANCE. For the Grand Alliance, see SUCCESSION WARS.

Allibone, SAMUEL AUSTIN, LL.D., an American author and bibliographer, was born in Philadelphia, April 17, 1816. Though at first engaged in mercantile pursuits, he was an earnest student of English literature, which bore fruit in 1853, when he began the work by which his name is identified in literature and bibliography, his *Critical Dictionary of English Literature and of British and American Authors* (3 vols. 1858-70-71). This work contains notices of 46,499 authors, and forty classified indexes of subjects. Dr Allibone also published an *Alphabetical Index to the New Testament* (1839); *Poetical Quotations* (1873); *Prose Quotations* (1876); *Great Authors of All Ages* (1879). Since 1879 he has been head of the Lenox Library, New York.

Allier, a river of Central France, rising in the watershed of the east of the department of Lozère, and flowing 233 miles northward through Haute-Loire, Puy-de-Dôme, and Allier, till it falls into the Loire below Nevers.

Allier, a department in the centre of France, has an area of 2822 sq. m., and a pop. of (1886) 424,582. It is a hilly district, especially in the south, sloping down towards the river Loire in the north, and is partly woody, but generally well cultivated, producing the usual kinds of grain with wine and oil. It is also rich in minerals, especially iron, coal, antimony, manganese, and marble. The majority of the population is engaged in agriculture. Mineral springs are found at Vichy and elsewhere. The chief town is Moulins.

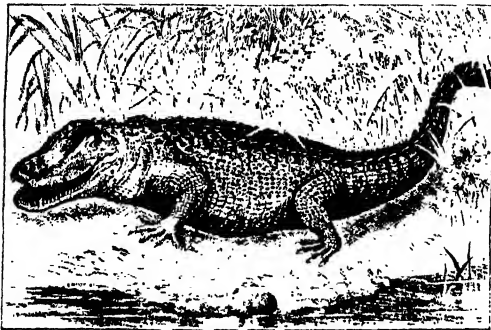
Allies, THOMAS WILLIAM, born at Bristol in 1813, passed from Eton to Wadham College, Oxford, where he obtained a first class in 1832. He became examining chaplain to Bishop Blomfield, who in 1842 presented him to the rectory of Launton, Oxfordshire. In 1850 he joined the Roman Catholic communion, and published the *See of St Peter*, accounting for his conversion. His marriage excluding him from the priestly office, he became secretary to the Catholic Schools Committee in 1853, and published a number of able controversial works, among them *Per Crucem ad Lucem, the Result of a Life* (1879), and *The Throne of the Fisherman* (1887).

Alligation, from a Latin word signifying 'to bind together,' is a rule in arithmetic which teaches how to solve such questions as the following: 3 lb. of sugar at 6d. are mixed with 5 lb. at 10d.; what is the price of a pound of the mixture? or: In what proportion must sugar at 6d. be mixed with sugar at 10d. to produce a mixture at 8½d.? The solution of the first is $\frac{3 \times 6 + 5 \times 10}{3 + 5} = 8\frac{1}{2}$ d.

In the second, the proportional number for one ingredient is the difference between the price of the other and that of the mixture; the number for the cheap sugar is therefore 1, and for the dear, 2½, which are as 3:5, so that there must be 3 lb. at 6d. for every 5 lb. at 10d. If there are more than two ingredients, the problem becomes indeterminate; that is, it admits of a variety of answers. Thus: Of three metals, whose specific gravities are 10, 15, and 16, it is required to compose an alloy, whose specific gravity shall be 14. The conditions will be answered by mixing them in any of the following proportions: 1, 2, 1; 2, 2, 3; 6, 2, 11, &c.

Alligator (Span. *lagarto*, 'a lizard'), a genus of Crocodilia, the highest sub-class of reptiles. The alligator family (Alligatoridae) includes three genera—Alligator, Caiman, and Jacare, which differ from crocodiles in their shorter and broader

head; in their more unequal teeth; in the presence of pits on the upper jaw, which receive the first and fourth lower-jaw teeth; in the limited extent of the union between the two lower jaws, which does not extend backwards beyond the fifth tooth; in the separation between the scales of neck and back; and in other less notable characters. Generally, however, they resemble crocodiles both in habit and structure: e.g. in the lizard-like body, with powerful tail and short legs; in the bony armature of the skin; in the abundant teeth fixed in sockets; in the large head, with very solid skull and nostrils at the end of the snout; in the double ventricle of the Heart (q.v.); and so on. The alligators are now exclusively confined to the warmer parts of America, but fossil forms indicate a much wider distribution. They vary in size from 2 to 20 feet. The genus *Alligator* includes a few species, of which the most familiar is *Alligator lucius*, the pike-headed alligator of the Mississippi



Pike-headed Alligator (*Alligator lucius*).

region. The snout is broad, flattened, and rounded; the nostrils are separated by a prolongation of the nasal bone; the feet are webbed to about the middle; the bony plates of the back are not articulated together, and there are none on the ventral surface. There are twenty teeth on each of the upper and lower jaws. The lids of the gleaming eyes are fleshy and smooth. The genus *Caiman* is at home in tropical South America, but extends northward to Mexico. The nostrils are undivided, the webs of the feet are still more rudimentary, the bony plates of the back are articulated to form a connected armour, and there is also a ventral shield of jointed plates. The eyelids are strengthened by an internal bony plate, and there are twenty teeth on each jaw above, and twenty-two below. The *Jacare* closely resembles the *Caimans*, and is also South American. There are fewer teeth, rougher eyelids, and minor differences of little importance. All these forms occur abundantly in the rivers, especially in quiet corners where the current is not too rapid. During the floods of the wet season they frequent adjacent basins, while in other circumstances they avoid the consequences of cold or drought by burying themselves in the mud and remaining torpid till the return of suitable conditions recalls them to active life. They feed for the most part on fishes, which they are said to stun with their tails; but many of them are extremely, and often unadvisedly, omnivorous. After seizing some land animal, such as sheep or pig, they frequently allow it to drown without relaxing their grip, and then return to the shore to eat it at leisure. While most of them seem timid and shy of man, especially when on land, they are sometimes emboldened by hunger to venture an attack. They are to a large extent nocturnal animals, and their loud harsh bellow is a familiar sound in the districts which they frequent. The

large eggs are laid on shore in a hollow in the sand, covered over with grass and reeds, and left to themselves and the sun's heat. As many as sixty may be laid in one nest, arranged in separate layers. The young are developed before the period of flooding, and are carefully tended by the mother alligator. In spite of this, the majority probably fall victims to large fishes, birds of prey, and hardened male alligators. The flesh of some forms (*Jacare*) is eaten by Indians and negroes. It has a musky flavour, and this smell is also very characteristic at pairing time. An alligator oil, said to burn well, is also utilised; and the tough skin forms a strong leather, useful for saddlery and other purposes. Fossil remains prove the ancient standing of the alligator family.

Alligator Apple. See CUSTARD APPLE.

Alligator Pear. See AVOCADO PEAR.

Allingham, WILLIAM, a popular poet, of English origin, born at Ballyshannon in Ireland in 1828. He contributed to the *Athenæum*, *Household Words*, and other journals, while doing the duties of a commissioner of taxes in London, and in 1871 he succeeded Froude as editor of *Fraser's Magazine*. His first volume of poems appeared in 1850; his second, *Day and Night Songs*, in 1854, and in an enlarged form, illustrated by Rossetti and Millais, the year after. In 1864 first appeared in book form *Laurence Bloomfield in Ireland*, a narrative poem of nearly 5000 lines, in decasyllabic couplets, on contemporary Irish life. He published in 1877, *Songs, Ballads, and Stories*, a collection of new pieces, together with revised versions of earlier poems; and in 1887, *Irish Songs and Poems*. In 1874 he married Helen Paterson, who, born in 1848, entered the schools of the Academy in 1867, and early made herself a name by her illustrations for the *Cornhill* and the *Graphic*, and by her water colours.

Alliteration is the frequent occurrence in a composition of words beginning with the same letter. In Old German, Anglo-Saxon, and Scandinavian poetry, alliteration took the place of rhyme. This kind of verse, in its strict form, required that in the two short lines forming a couplet, three words should begin with the same letter, two in the first line or hemistich, and one in the second; as in the following couplet of Anglo-Saxon poetry:

*Larum folcra
Fea dambroce* — CAPOEN.

Alliterative poems continued to be written in English after it had assumed its modern form; the most remarkable example is *Piers the Plowman*, a poem of the 14th century, of which the following is a specimen, the two hemistichs being written in one line:

*Meerȝ heht that marȝ, a meek thing withȝ,
A full beuȝen burȝ, and baxoun of spech.*

Even after the introduction of rhyme, alliteration continued to be largely used as an embellishment of poetry. Shakespeare ridicules the excessive use of it by man, poets of his time in *Midsummer-Night's Dream* (V. i. 147), where he makes Quince say in his prologue:

*With birds, with bloody blameful blade,
He bravely broach'd his boiling bloody breast.*

In *Love's Labour's Lost* (IV. ii. 57) he burlesques it again, making Holofernes 'something affect the setter, for it argues facility;' and Sidney, in his *Astrophel and Stella*, 15, thus addresses poets given to its use:

*You that do Dictionaries' method bring,
Into your rimes, running in rattling rows.*

Poets in all times have employed it for the sake of the point and emphasis it often gives a line. The satirist Churchill speaks of himself as one

*Who often, but without success, had pray'd
For apt alliteration's artful aid.*

A fine example of its effect in poetry occurs in the well-known lines of Coleridge :

The fair breeze blew, the white foam flew,
The forewail followed free.

But the perfect ear of that consummate master of rhythm could tolerate only its occasional use. Shakespeare was himself a master of alliteration in its proper use, and as a poetical device it has survived to our own day, no poet having used it with finer effect than Tennyson, and none with more wearisome monotony than the latest of our greater poets, Mr Swinburne.

But alliteration is not confined to verse; the charm that lies in it exercises great influence on human speech generally, as may be seen in many current phrases and proverbs in all languages, as 'life and limb,' 'house and home,' 'kith and kin,' 'Land and Leute,' &c. It often constitutes part of the point and piquancy of witty writing. Among modern writers this application of alliteration is perhaps most felicitously exemplified by Sydney Smith, as, when in contrasting the conditions of a dignitary of the English Church and of a poor curate, he speaks of them as 'the Right Reverend Dives in the palace, and Lazarus-in-orders at the gate, doctored by dogs and comforted with crumbs.'

In the early part of the 17th century, the fashion of hunting after alliterations was carried to an absurd excess; even from the pulpit, the chosen people of God were addressed as 'the chickens of the church, the sparrows of the spirit, and the sweet swallows of salvation.'

See Professor Skeat's elaborate essay prefixed to vol. iii. of the reprint of Bishop Percy's *Folio Manuscript* (1868), and Guest's *English Rhymers* (2d ed. by Skeat, 1882).

Allium, a genus of Liliaceæ (q.v.), containing about 150 species. These are perennial, or more rarely biennial, herbaceous plants, usually producing tufted bulbs by their thickened and concentric leaf bases, and are natives chiefly of the temperate and colder regions of the northern hemisphere. Garlic, Onion, Leek, Shallot, Chive, and Romanule (q.v.) are species of this genus in common cultivation. A number of other species are occasionally used on account of their characteristic nutritive and flavouring qualities in different countries. Nine species are natives of Britain, of which the most common is *Allium ursinum*, Ramsons or Wood garlic, a species with much broader leaves than most of its congeners. It is most frequently found in moist woods and hedge-banks; but occasionally in pastures, in which it proves a troublesome weed, communicating its powerful odour of garlic to the whole dairy produce. (Crow Garlic *Allium vineale*), another British species, is occasionally troublesome in the same way, in drier pastures. Both are perennial, and to get rid of them their bulbs must be perseveringly rooted out when the leaves begin to appear in spring.

Alloa, a seaport town in Clackmannanshire, on the left bank of the tidal Forth, 6½ miles E. of Stirling, and 35 WNW. of Edinburgh. Among its buildings are the county court-house (1865), the handsome new town-hall (1887), the corn exchange (1862), and the parish church (1819); and its special feature is the Linnet Walk (1714), leading up from the harbour. It is an active centre of trade and manufactures, the latter including whisky, ale, woollen goods, glass, iron, &c.; while a large quantity of coal is exported from pits in the neighbourhood of the town. The harbour is fair, having been greatly improved in 1863. The Forth is here crossed by a railway viaduct (1885), and there is regular steam communication by the river with Edinburgh and Stirling. Close by is Alloa House (1838), the seat of

the Earl of Mar and Kellie, with Alloa Tower, 89 feet high, and built about 1223. Here Queen Mary spent part of her childhood, as also did James VI. and Prince Henry. Pop. (1841) 5443; (1881) 10,691.

Allobroges, a Celtic race of Gaul, whose territory lay between the Isère, the Lake of Geneva, and the Rhone, corresponding to the later Dauphiné and Savoy. Their chief town was Vienna (Vienne); their frontier town against the Helvetii, Geneva. First heard of as allies of Hannibal at the time of his invasion, 218 B.C., they were subjected to the Roman yoke in 121 by Quintus Fabius Maximus, thence called *Allobrogiens*, and from that time were governed as a part of Gallia Narbonensis. But they were civilised with difficulty, and were ever ready for rebellion.

Allocution, which simply means an 'address,' is applied, in the language of the Vatican, to denote specially the address delivered by the pope at the College of Cardinals on any ecclesiastical or political circumstance. It may be considered as corresponding in some measure to the official explanations which constitutional ministers give when questions are asked in parliament. The Papal court generally makes use of this method of address, when it desires to guard a principle which it is compelled to give up in a particular case, or to reserve a claim for the future which has no chance of recognition in the present. Allocutions are published by being affixed to the doors of St Peter's.

Allo'dium, or ALLODIAL TENURE, has no well-defined general meaning in Law. It refers to a primitive form of land-tenure, which both in Celtic and Teutonic communities, seems to have succeeded the original shifting allotment among the members of the tribe, the *sors* of the Burgundian law. The allod, udal, or dachas in an untaxed freehold held by right of blood. In Scandinavia its owner was the Udder, in Ireland the Buididh, in some parts of Germany the Bunder, in Kent the Caveller. The allod was in some places inalienable, except in cases of starvation, and was not confiscated by the felony of the holder. Its most definite characteristic was freedom from the homage and other burdens which came in with the fief. Prior to feudalism, for instance, the land of France was either allodial or fiscal, under the official tenure of the *graphes*. The *franc alleu noble* was practically an allod conferred by a grant of *saliceterra* or royal land. The extension of royal authority led to the system of benefices, and ultimately, under the influence of the Roman land doctrine of emphyteusis, to that of fiefs. Prior to the Conquest the feudalism that existed in England was based on service and the comitatus of the king, and was therefore different from the developed continental feudalism, of which the knight-service and the duties payable were the basis. But although the *backland* of the Anglo Saxons resembles the primitive allod, the latter had disappeared before the Norman Conquest. When the principal landholders of England surrendered their lands into the hands of the Conqueror at the council of Sarum, feudality was formally recognised and it henceforth became a fundamental maxim in the law of real property, that 'the king is the universal lord and original proprietor of all the lands in his kingdom, and that no man doth or can possess any part of it, but what has mediately or immediately been derived as a gift from him, to be held upon feudal services' (Blackstone, vol. ii. p. 51, Kerr's edition). See FEUDAL SYSTEM. This change was accomplished by private arrangements between the allodial proprietors and the prince, the former being anxious to exchange their nominal independence for the greater security enjoyed by the vassals of the sovereign, the latter being willing to receive

them as dependents, for the sake either of their personal services in war, or latterly, for the equivalents of these services, in money or the produce of the lands. In some countries, feudality, though general, was not universal; and allodial tenures consequently continued to subsist alongside of those originating with the crown. In this position was Denmark, and it is curious that the only examples of allodial tenures to be met with in Great Britain are the Udal rights in the islands of Orkney and Shetland, which formerly belonged to that country. These lands are generally held without written title, and entirely free from feudal action. By the law of Scotland, all property and superiorities belonging to the crown itself, and all churches, churchyards, manse, and glebes, the right to which does not flow from the crown, are regarded as allodial; and the term in a wider sense, as opposed to *feudal* generally, is sometimes used with reference to movable property. The word *udal* occurs in a statute of the Scottish parliament so recently as 1690. In the United States, although the word *fee* is in use, the feudal relation does not exist, and the title to land is essentially allodial. Every tenant in fee simple has absolute and unqualified dominion over his land.

The etymology of the word allodium has been much discussed, but it is doubtless 'Merovingian Latin,' appearing in French as *allen*, which Brachet derives from *alud*, an old High-German word for free ownership. Skeat, following Cleasby and Vigfusson, traces it to the old Norse *allu-odal*, 'a property of ages.' This compound again comes from *aldr*, 'old age' (akin to English *eldest*), and *odal*, 'a patrimony' (akin to the Anglo-Saxon *adale*, 'noble'). *All-odal*, contracted to *allodal*, would give rise to Low Latin *allodialis*, from which the substantive is most probably derived.

Allopathy, a mode of curing diseases by producing a condition of the system opposite to that characteristic of the disease; a name invented by Hahnemann for the standard system of medical treatment, as opposed to Homoeopathy (q.v.). The word is derived from the Greek *allos*, 'other,' and *pathos*, 'suffering.'

Allotments. In England, allotments are small plots of land let to agricultural labourers, who cultivate them during their spare time. The system is traced back to the year 1790, when the lord of a manor near Tewkesbury, observing that the occupants of certain cottages provided with a little land were marked by superior comfort and respectability, set apart 25 acres for the use of the poor. The result was, that in two years the poor-rates were reduced to 4d., as compared with 2s. 6d. to 5s. in surrounding parishes. In 1795 a select committee of the House of Commons reported favourably on the system. In 1819 and again in 1831, acts were passed for the promotion of the allotment system; societies were also formed for the same object. The severe distress among the labourers, and the alarming rise of the rates under the old poor-law, forced the subject on the attention of the landlords and the legislature. In connection with the Inclosure Acts, it was particularly provided that garden allotments should be reserved for the poor as a compensation for the advantages lost to them through the inclosing of lands; but so little was done in this way, that in 1868 it was proved by a government commission that of 7,000,000 acres inclosed since 1760, only 2119 had been thus set aside for the poor. Of recent years much attention has been given to the question of allotments, chiefly in connection with proposals for giving to local bodies compulsory powers for creating them. A great deal for the extension of the system has already been done by voluntary arrange-

ment on the part of the landowners. According to the last authoritative return in 1873, there were in England 242,000 allotments. In view of the continued depopulation of rural districts, the decline of our agriculture, and the long-established divorce of the labourer from the land, the expediency of giving the worker a larger interest in the soil of the country is generally admitted; and it has been found that the allotment system, when wisely applied, is beneficial to all concerned. The practice of letting land for allotments, it may be added, varies greatly in different parts of the country. A quarter of an acre is about the average size of an allotment; but they are often much larger. They are usually cultivated with the spade. In Scotland and Wales allotments hardly exist. In 1887 a bill, confined to England, was passed, by which local authorities have compulsory powers for providing allotments and common pasturage. See the Earl of Onslow's *Landlords and Allotments* (1886).

Allotropy is a term applied in chemistry to the peculiarity, which certain elements exhibit, of existing in two or more distinct modifications, which, although chemically identical, usually differ very much in their physical properties, such as colour, density, hardness, and so forth. Such modifications are said to be *allotropic* (from Greek words for 'of another manner'). The nature of allotropy will be best illustrated by citing some of the most striking as well as familiar examples.

The element carbon, which is a constituent of the very numerous chemical compounds commonly called organic bodies, is known in several allotropic modifications. Of these, two crystalline forms occur in nature—the first, the widely distributed but comparatively rare diamond; and the second, graphite or black lead, familiar to all as the substance used in the manufacture of the so-called *lead* pencils. These two forms of carbon occur, as has been said above, crystallised the diamond, in forms related to the cube, while graphite crystallises in thin hexagonal plates; and they thus present an example of what chemists call *dimorphism*, or the occurrence of the same substance in two totally distinct crystalline forms, which are not geometrically related to each other.

Besides the two crystalline forms of carbon found in nature in an almost pure state (graphite usually contains at least a small proportion of impurities), the various kinds of wood and animal charcoal, and coke, consist of carbon in a more or less pure state. These latter kinds of carbon are called *amorphous*, because they have not any definite crystalline form.

It is almost needless to point out the entire difference from each other in regard to colour, transparency, hardness, and other physical properties of the diamond and of graphite, diamond being, when quite pure, colourless and transparent, and the hardest of known substances; while graphite is black and opaque, and sufficiently soft to mark paper easily. That the various forms of carbon are chemically identical, is proved by burning any of them in oxygen, when in each case it is found that carbonic acid gas is produced and nothing else, and that exactly the same quantity of this gas is produced from equal weights of the various kinds.

In the case of many allotropic substances it is possible easily to convert one modification into another, but this is not markedly so in the case of carbon. When diamond is heated in the electric arc, out of contact with the air, it blackens and swells up into a somewhat coke-like mass. Many attempts have been made to prepare artificial diamonds from the more common kinds of carbon; but as yet the measure of success attained has not been great, although minute crystals have been

obtained, which under the microscope exhibited the crystalline form of true diamonds.

Phosphorus presents another very good instance of allotropy. Several forms of this element have been described, but only two are commonly known. These are ordinary phosphorus, which is a pale yellow, semi-transparent, waxy solid, soluble in carbon bisulphide, and crystallising from this solution in octahedra; and red or amorphous phosphorus, usually seen in irregular lumps or in powder as a dark, reddish-brown, non-crystallisable solid, which is not soluble in carbon bisulphide. Ordinary phosphorus is very readily oxidised in the air, and must be preserved under water to prevent its taking fire, and it is extremely poisonous. The amorphous variety does not undergo any change in the air at ordinary temperature, and it is not poisonous. When ordinary phosphorus is melted in close vessels, and kept for a long time at a temperature near its boiling-point, a certain proportion of it is converted into red phosphorus. This change is accompanied by the evolution of heat, as can be easily demonstrated by suitable experiment. From the mixture obtained, the red phosphorus can be separated by dissolving out the unchanged ordinary kind by means of carbon bisulphide. When heated to a temperature somewhat higher than that at which it was prepared, amorphous phosphorus changes back again into the ordinary kind. Most persons are familiar with the appearance of ordinary phosphorus as such. The brownish surface provided on the boxes of safety matches for igniting these consists mainly of amorphous phosphorus.

Sulphur, again, is known in several allotropic forms, some crystalline and some amorphous, which differ greatly in colour, melting point, solubility in solvents, &c. Most of these forms are, however, unstable, and quickly begin to change back again into ordinary sulphur. One of the most remarkable varieties is the so-called plastic sulphur, familiar to many as the clear yellow or brownish, pliable and elastic mass obtained by pouring melted sulphur, at or near its boiling-point, into water. This soft condition does not continue long, as in a few days the substance becomes opaque and hard, and passes, in great part, into the ordinary form of sulphur again. This change may be hastened by heating the plastic variety to near the melting-point of ordinary sulphur, when it suddenly becomes solid, giving out in doing so sufficient heat to raise its own temperature several degrees.

Another instance of allotropy, and one of great interest, is the existence of oxygen in two forms, as ordinary oxygen and as ozone. Both forms are gases, oxygen odourless, while ozone possesses a peculiar and powerful odour. The manner of formation in the atmosphere of the ozone, which is a constant constituent, in small quantity, of country and sea air, is not with certainty known. Ozone is formed when an electrical machine is worked, and also during many chemical processes, as in the slow oxidation of phosphorus in moist air. It is best prepared by passing what is known as the silent discharge of electricity through oxygen, by which means a considerable proportion of the oxygen is converted into ozone. Ozone is a much more active oxidising agent than oxygen, and the property is attributed to it of destroying deleterious organic impurities in the atmosphere.

The nature of the difference between allotropic forms of the same substance is, to some extent at least, understood in the case of oxygen: ozone being a condensed form of oxygen, and having a density half as great again as oxygen. Whilst the molecule of oxygen is represented by the formula O_2 , that of ozone is represented by O_3 . It is probable that an analogous explanation may be found to account for

the formation of allotropic modifications of carbon, sulphur, phosphorus, &c.

Allotropy is nearly related to ISOMERISM, which see.

Alloway. Burns's birthplace, and the scene of his *Tam o' Shanter*, lies on the right bank of the 'bonny Doon,' 2 miles S. of the town of Ayr. The 'auld clay biggin,' in which the poet was born on 23d January 1759, was in 1880 converted into a Burns Museum. The 'haunted kirk' still stands, a roofless ruin, near the 'Auld Brig,' and hard by is the Burns Monument (1820).

Alloy. Compounds or mixtures which different metals form with one another are called *alloys*. There is an exception, however, in the case of mercury. When it is mixed with another metal, the compound is termed an *Amalgam* (q.v.). All alloys retain the essential properties of metals. They possess metallic lustre, and conduct heat and electricity well. On the other hand, when the metals form compounds with non-metallic elements, such as sulphur or chlorine, their general properties are quite changed. Alloys have been divided into three groups: (1) Those formed by the metals lead, tin, zinc, and cadmium, which impart to their alloys their own physical properties in the proportions in which they themselves are contained in the alloy. (2) Those formed by almost all other metals. Such alloys as belong to this group do not get imparted to them the physical properties of their constituent metals in the proportion in which they are present. (3) Those which contain metals found in both these groups of alloys.

In an alloy the Specific Heat (q.v.) and the coefficient of expansion are always the means of those of its component metals. But in other physical properties a variation takes place. This is the case with specific gravity, which, in alloys of the first group, is the mean of their constituent metals; but in those of the second group, it is always greater or less than the mean specific gravity of their constituents. The increase in density indicates that the metals have contracted; in other words, that the metallic molecules have approached each other more closely; whilst the decrease in density denotes a separation of the molecules to greater distances from each other.

Again, in alloys of the first group, the conducting power for electricity is exactly proportional to the relative volumes of the component metals; while in alloys of the second group the case is different.

If lead, tin, zinc, or cadmium be mixed with any of the metals from which alloys in the second group are formed, this alloy has its coefficient of elasticity much increased. For example, coils of copper or silver wire are made straight by weights, by which a coil of brass or gun-metal wire will scarcely be altered in shape.

In some instances, when two melted metals are mixed together to form an alloy, an evolution of heat occurs, which is believed to indicate that a chemical compound has been formed. This is the case with copper and zinc, copper and aluminium, platinum and tin, &c. Many alloys, however, can be obtained in well-defined crystalline forms, which is usually considered a test of a definite chemical compound; yet a number of these—copper-zinc alloys, for example—crystallise in the same form, even when the proportions of the component metals vary considerably.

A curious fact may be mentioned in regard to the solubility of alloys. Platinum by itself is quite insoluble in nitric acid, but if it be alloyed with silver the compound is completely dissolved. Silver, on the other hand, readily dissolves in

nitric acid, but it will not do so when mixed with a large quantity of gold.

The strength or cohesion of an alloy is generally greater than that of the mean cohesion of the metals contained therein, or even of that of the most cohesive of its constituents. Thus, the breaking weight of a bar of copper or tin is very much lower than the breaking weight of a bar of the same size composed of certain alloys of tin and copper.

The most useful alloy in the arts is brass. This compound metal is next to iron in importance. Several kinds are made varying in composition from equal parts of copper and zinc, to five parts of copper with one of zinc. According to the proportions of these metals in the alloy it is called sheet-brass, Pinchbeck Brass (q.v.), Dutch brass or Dutch Metal (q.v.), ordinary yellow brass, Muntz's metal or ship-sheathing brass, and by several other names (see BRASS).

There are some important alloys of copper and tin. Among them Bronze (q.v.), Gun-metal (q.v.), Bell-metal (q.v.), and Spendium Metal (q.v.). In these, the proportions of the two constituents vary from equal parts of copper and tin, to ten parts of copper with one of tin. The most cohesive, that is, the strongest, of them is a bronze consisting of six parts of copper to one of tin. Phosphor bronze is an invention of recent years. The addition of from 0.25 to 2.5 per cent. of phosphorus to a bronze containing from 7 to 8 per cent. of tin, gives it greater hardness, elasticity, and toughness. This alloy is now much used for parts of machinery.

German Silver (q.v.) is an alloy composed, in its best quality, of two parts of zinc, four of copper, and one of nickel. Britannia Metal (q.v.) generally consists of about ninety-two parts of tin, eight of antimony, and two of copper. This is a softer metal than German silver, but both are largely manufactured into such objects as teapots, jugs, spoons, and the like, many of them being plated with silver. Nickel-copper alloys are used in the United States, Belgium, and Germany, for coins.

Pewter is a tin alloy which was more used formerly than now. Its composition varies. Commonly, it consists of four parts of tin to one of lead, but sometimes it is tin with a little copper. Type metal (see TYPE) is a compound of fifty parts of lead, twenty-five of antimony, and twenty-five of tin, but it varies slightly. Fusible Metal (q.v.) melts in hot water. One kind of it is composed of three parts of tin, five of lead, and eight of bismuth, and melts in hot water. This alloy is now a good deal employed in stereotyping and in obtaining copies of woodcuts. 'Albion metal,' which is largely used in some minor Birmingham manufactures, is an example of two metals combined by pressure, and therefore is not, strictly speaking, an alloy. It consists of tin laid on lead, the two metals being made to cohere by passing them between rollers. White, or anti-friction, metal, recently much employed for certain kinds of machinery bearings, has, in one variety, a composition of eighty-five parts of tin, ten of antimony, and five of copper.

Aluminium-bronze (see ALUMINIUM), an alloy very closely resembling gold in appearance, which is much used for pencil-cases, chains, and some larger objects, varies in composition from ninety-five of copper and five of aluminium, to ninety of copper and ten of aluminium. A compound of silver and aluminium is sometimes used for watch-springs, and for spoons and forks. Dentists use a very ductile alloy composed of two parts by weight of silver and one of platinum. A metal formed of nine parts of platinum and one part of bismuth, has recently been employed for the stan-

dard metre-measures by the Parisian commission for the international metrical system. An alloy of osmium and iridium, which is not attacked by acids, is employed for tipping gold pens, and sometimes also for the bearings of the mariner's compass.

Sterling silver consists of 11 oz. 2 dwt. of silver, and 18 dwt. of copper in the troy pound. That is, it contains 7.5 per cent. of copper. With certain exceptions, the English law requires that all silver wares, as well as coins, shall be of this standard. The proportion of *alloy* in gold coin and plate is also regulated by law. It is well to state that an assayer or bullion-dealer uses the term *alloy* in a different sense from what may be called its common meaning. He would say that standard silver contains 18 dwt. of *alloy* in the pound troy; but the more general, or at least, the more scientific, way is to call it an alloy of silver and copper. It is the same with gold. Pure silver is too soft to be used for anything which is to be much handled. A little copper imparts to it greater hardness and toughness, and makes it more easily fusible. The alloy used for English is said to wear better than that used for any foreign silver coin, although the difference in one or two cases is small.

When gold is to be used for coins, jewelry, or plate, it requires to be alloyed with copper or silver, or with both, in order to harden it. Like silver, it is too soft when pure. There are five legal standards in Great Britain for articles made of gold, i.e. alloyed gold, apart from coin. These are called 22, 18, 15, 12, and 9 carat gold. That is to say, these figures represent the number of parts of pure gold in every twenty-four parts of the alloy used by the goldsmith or jeweller. English sovereigns are made of a mixture of twenty-two parts gold to two of copper, and this is called 22-carat or standard gold. In Germany, Italy, and the United States, standard gold for the coinage is 21.6 carats. Gold jewelry usually contains both copper and silver, and, according to the proportion of the constituents, the objects have different shades of yellow.

In the United States, it is declared by law that the standard for both gold and silver coins shall be such, that of a thousand parts by weight, nine hundred shall be of pure metal, and one hundred of alloy. Until lately, it was provided that the alloy of gold coins might be of either copper or silver; but by a recent regulation, only copper is used in the alloy either of silver or gold coins.

All-Saints' Bay, in the province of Bahia, on the coast of Brazil, forms a superb natural harbour, in which the navies of the whole world might ride at anchor. Its length from N. to S. is 37 miles; its breadth from E. to W. 27. The town of Bahia (q.v.) lies just within it.

All-Saints' Day, in Old English All-Hallows, All-Hallowmas, or simply Hallowmas, a church festival, introduced because of the impossibility of keeping a separate day for every saint. As early as the 3rd century, on the cessation of the persecution, the Sunday after Easter was appointed by the Greek Church for commemorating the martyrs generally; and in the Church of Rome a similar festival was introduced about 610, when the old heathen Pantheon (the present Rotunda, or Santa Maria dei Martiri) was consecrated on 13th March. But the real festival of All Saints was first regularly instituted by Gregory IV. in 835, on 1st November. The choice of the day was doubtless determined by the fact that November 1, or rather the eve or night preceding it, was one of the four great festivals (1st February, 1st May, 1st August, and 1st November) of the heathen

nations of the north; for it was the policy of the church to supplant heathen by Christian observances. See BELTANE and HALLOWEEN.

Allsopp, SAMUEL (born 1780), a member of the great brewing establishment of Allsopp & Sons, Burton-on-Trent, which ranks third amongst the brewing firms of the United Kingdom, was a descendant of an old family, and was noted for the charities of his public and private life. On his death in 1838, he was succeeded in the business by his sons Charles, James, and Henry. To the last of these the modern development of the firm is largely due. He represented Worcestershire in parliament (1874-80), and in 1880 was created a baronet. After his retirement from the firm, he was raised to the peerage under the title of Lord Hindlip of Hindlip and Alsop-en-le-Dale; he died April 3, 1887. The three breweries of the Allsopps employ about 1600 people, and are connected with the maltings and cooperages by ten miles of railway. On its conversion into a limited company in 1887, the concern was valued at £3,300,000; and the shares were eagerly competed for by investors.

All-Souls' Day, a festival of the Roman Catholic Church, which falls on 2d November. The object of it is, by prayers and almsgiving to alleviate the sufferings of the souls in purgatory. It was first instituted in the monastery of Clugny, 993, and is said to have originated thus: A pilgrim returning from the Holy Land, was driven by a storm on a rocky island somewhere between Sicily and Thessalonica. Here he found a hermit, who told him that among the cliffs of the island was situated the opening into the nether world, through which huge flames ascended, and the groans and cries of souls tormented by evil angels were audible. The hermit had also frequently heard the complaints and imprecations of the devils, at the number of souls that were torn from them by the prayers and alms of the pious; they were especially enraged, he said, against the abbot and monks of Clugny. The pilgrim on his arrival acquainted Odilo, abbot of Clugny, with what had come to his knowledge, and the abbot thereupon appointed the day after All Saints to be kept in his monastery as an annual festival for 'All Souls.' The observance in a short time became general, without any ordinance at large on the subject.

Allspice, a name frequently given to the kind of spice called Pimento (q.v.), or Jamaica pepper, the fruit of *Eugenia pimenta* and *E. acris*. The name originated in its being supposed to combine the flavour of different spices, particularly cinnamon, nutmeg, and cloves.

Allston, WASHINGTON, an American painter, was born at Waccamaw, South Carolina, in 1779. He graduated at Harvard in 1800, and went next year to London to study art under his countryman West, who was at that time president of the Academy. In 1804 he proceeded to Rome, where he lived for some years in close intimacy with Thorwaldsen and Coleridge. After a short stay in America (1809) he once more visited England, and in 1811 gained the 200-guinea prize of the British Institution. In 1817 he went to Paris and the year after returned to America, and permanently fixed his residence at Cambridge Port, near Boston, where he lived, cultivating his art and the muses, till his death on 9th July 1843. In 1819 he had been elected a London A.R.A. His pictures are very numerous, the best being scriptural subjects. A composition of great size, 'Belshazzar's Feast,' occupied from time to time the last twenty-five years of his life, but was left unfinished. Allston's style is noble, his ideas are imaginative, and many of his paintings evince a true poetic spirit. In colouring, he imitated the

Venetian school, and for this reason he has been styled 'the American Titian.' Coleridge said of Allston, that he was surpassed by no man of his age for artistic and poetic genius. He was author of a poem, *The Sylphs of the Seasons* (Lond. 1813), and the art-novel, *Monaldi* (Boston, 1842). His *Lectures on Art* were edited by R. H. Dana (1850).

Alluvion takes place where land is gained from the sea by the washing up of sand and earth so as to make it *terra firma*. By the law of England, if the addition to the soil thus made be by small and imperceptible degrees, it goes to the owner of the land immediately behind; but if the alluvion be a sudden and considerable acquisition from the shore, the ground acquired shall belong to the crown. In the Scottish law, again, if the alluvion is made insensibly, it is said to 'accrese' to, or becomes the property of the owner of the ground to which the addition is made; but if it be caused by a violent flood, or by any convulsion of nature, the ground so added to the soil does not belong to the owner of the latter, but remains the property of the person of whose land it originally formed part. The Scottish law does not recognise such right in the crown on this subject as is allowed by the law of England. In Scotland, the shore is held under the burden of the crown's right as trustee for the public uses, of which navigation and fishing are the chief. In the United States, alluvion signifies the increase of the earth on a shore or the bank of a river by the force of the water, gradually and imperceptibly made. The proprietor of the bank is the gainer, as in England. Where an open space by the water's edge is public, the public is entitled to the alluvion.

Alluvium, a term originally applied to those deposits which were supposed to have been formed subsequently to the Flood, while Diluvium (q.v.) included the strata produced by it. In modern geological classification, these two terms have ceased to be used in this sense. By alluvium is now meant any earthy material deposited by the ordinary operation of water in motion. Hence it includes the mud, silt, sand, and gravel brought down by streams and rivers, and spread over lower lands, where it frequently forms flats and terraces. Some geologists extend the term to those wide accumulations of silt and mud which are formed in the upper reaches of estuaries, and laid bare at low tide. These are spoken of as *marine alluvium*. See DELTA, DENUDATION.

Allygurb. See ALIGARB.

Allyl (Lat. *allium*, 'garlic') is an organic radical, represented when in combination by C_3H_5 , and when in the free state by C_3H_5 . Its properties, and those of some of its most important compounds, are described in the article GARLIC (OIL OF).

Alma, a river in the Crimea, rising at the foot of the Tchaudir Dagh, and flowing westward into the Bay of Kalamita, about half-way between Eupatoria and Sebastopol. On the steep banks of this stream, through the channel of which the British troops waded amidst a shower of bullets, a brilliant victory was won on the 20th of September 1854, by the allied armies of Britain and France, under Lord Raglan and Marshal St Arnaud, over the Russian army commanded by Prince Menschikoff. It was the first battle of the Crimean war.

Almacantar, a name for circles of altitude parallel to the horizon, and hence for an astronomical instrument for determining time and latitude. The almaccantar consists of a telescope revolving on a horizontal axis, which can be clamped at any altitude, the whole resting on a float sustained in a trough of mercury. The clamped telescope, when its floating support is

turned, will therefore trace out a circle of equal altitude, and by the transits of stars across this circle, time and latitude can be obtained with very great accuracy. It can also be used for determining the apparent places of the heavenly bodies.

Almack's, a suite of assembly-rooms in King Street, St James's. They were built in 1765 by Almack, a tavern-keeper, and were hence called Almack's Rooms; they are now generally called Willis's Rooms, from the name of Almack's heir. The name is chiefly associated with the balls that, from the opening of the rooms till about 1840, were held there under the management of a committee of ladies of high rank; and the circle having admission to the balls at Almack's was at the beginning of the century regarded as the seventh heaven of the fashionable world. Willis's Rooms are also much used for dinners and concerts, as well as balls. Almack's descendants say he was a Yorkshireman; the usual story is that he was a Highlander called MacCaul, who transposed his name when he came to London as valet to a nobleman. Almack died in 1781.

Alma'da, a town of Portugal, in the province of Estremadura, built upon a height over the Tagus, opposite Lisbon. Pop. 5091.

Almaden, a town in Spain, 50 miles SW. of Ciudad Real, situated in the chain of the Sierra Morena. Pop. 7755. It is famous for its twelve rich quick-silver mines, employing about 4000 miners, and yielding an annual output of 2,500,000 lb. The present mines, which have been carried to a depth of 1170 feet, date from the 17th century; but quick-silver was largely worked here by the Romans in the time of Pliny. Crown property, they were rented by the Fuggers of Augsburg (1525-1645), and by the firm of Rothschild (1836-63), but are now again carried on by government.

—**NEW ALMADEN**, in the Coast Range, California, 12 miles from San José, was first worked regularly for mercury in 1845, and now yields upwards of 2,000,000 lb. a year.

Almagest, the name given by the Arabs to the great work of the astronomer Ptolemy (q.v.).

Almagro, a town of New Castile, Spain, 13 miles ESE. of Ciudad Real. It has a great manufacture of lace. Pop. 8628.

Almagro, **DIEGO D'**, a Spanish *conquistador*, was born in 1461 or 1475, and was a founding who derived his name from the town near which he was found. After serving in the army, he sailed to seek his fortune in the New World, where he amassed considerable wealth by plunder, and became one of the leading members of the young colony of Darien. In 1522 he formed, with Pizarro, the design of conquering Peru an undertaking crowned ten years afterwards with marvellous success. Receiving permission from the Spanish court to conquer for himself a special province south of Pizarro's territory, he marched on Chili in 1536, penetrated as far as the Copalimbo, and returned in 1537, just when the Peruvians had flown to arms and shut up the Spaniards in Cuzco and Lima. As these towns lay south of Pizarro's district, they were claimed by Almagro. He dispersed the Peruvian army before Cuzco, and advanced against Lima, hoping to make himself sole master of the country. But on the 6th April 1538, he was defeated in a desperate engagement with the Spaniards under Pizarro near Cuzco; and on the 26th, he was strangled in prison, and his corpse beheaded in the market-place of Cuzco. His half-caste son, Diego, collecting some hundreds of his father's followers, stormed Pizarro's palace, and slew him (1541); then proclaimed himself captain-general of Peru; but, defeated in the

bloody battle of Chupas (16th September 1542), he was executed along with forty of his companions.

Almali. See **ELMALU**.

Alma Mater (Lat., 'nourishing mother') is a name given to a university in relation to those who have derived instruction from it. The word *alma* ('nourishing,' 'kindly') was applied by the Latin authors to such of the deities as were friendly to men—Ceres, Venus, &c.—and also to the earth, the light, the day, wine, and the soil.

Almanac, a word applied in Roger Bacon's *Opus Majus* (1267) to permanent tables showing the apparent movements of the heavenly bodies. It is the Italian *almanacco* (about 1345), the French *almanach*, and the Spanish *almanaque*, the immediate source of all which, according to Dr Murray, was apparently a Spanish-Arabic *al-mumākḥ*; an Arabic Castilian vocabulary (1505) giving *munākḥ*, 'a calendar,' and *munākḥ*, 'a sun-dial.' Further than this one cannot go, though attempts have been made to explain *munākḥ* from Semitic sources, and to connect it with the Latin *municeps* (properly *munus*), 'a sun-dial,' of Vitruvius, or with the *almanichiake* (in Eusebius, quoting Porphyrius), an Egyptian word signifying 'daily observation of things.' The *Fasti* (q.v.) of the Romans came nearer to our modern almanacs than the 'almanacs' known to Roger Bacon and Chaucer, for it was not till the 15th century that almanacs or *ephemerides* were prepared for definite periods, such as fifty or ten years; nor till the 16th for a single year. Thus, the earliest printed almanac was that *Pro pluribus annis*, published at Vienna in 1457 by the celebrated astronomer Purbach; whilst that printed at Nuremberg in 1473, by his pupil Regiomontanus, was for the thirty years from 1475 to 1506. The printer Engel of Vienna commenced the publication of an almanac in 1491; and Stöfler of Tübingen, in 1521. Copies of these are now very rare. In 1533 Babelais published, at Lyons, his almanac for that year, and renewed the publication in 1535, 1548, and 1550. The fame and popularity of the celebrated astrologer, Nostradamus (q.v.), gave such an impulse to the publication of predictions, that, in 1579, Henry III. of France prohibited the insertion of any political prophecies in almanacs—a prohibition renewed by Louis XIII. in 1628. Before this, in the reign of Charles IX., a royal *ordonnance* required every almanac to be stamped with the approval of the diocesan bishop.

Prophetic almanacs still circulate to an incredible extent in France, in the rural districts and among the uneducated. The most popular of all these is the *Almanach Liégeois*, a venerable remnant of superstition. It was first published at Liège in 1625 by one Matthieu Laensbergh, whose existence, however, at any time seems very problematical. The *Almanach Liégeois* was a most convenient one for the illiterate, since by certain symbols attached to certain dates, the most unlettered persons could follow its instructions: thus the rude representation of a phial announced the proper phase of the moon under which a draught of medicine should be taken; a pill box designated the planet most propitious for pills; a pair of scissors pointed out the proper period for cutting hair, a lancet for letting blood. Of course, amidst innumerable predictions, some may naturally be expected to come to pass. So in 1774, this almanac predicted that in the April of that year a royal favourite would play her last part. Madame Dubarry took the prediction to herself, and repeatedly exclaimed: 'I wish this villainous month of April were over.' In May Louis XV. died, and Madame Dubarry's last part was really played. The credit of old Matthieu was established more firmly than ever. In 1852 a number of

commissioners, appointed by M. Maupeou, minister of police, having examined between 7000 and 8000 of the national chapbooks, which included a great number of almanacs, pronounced them so deleterious, that it became necessary forcibly to check their circulation.

In England, so far was any restraint from being put upon the publication of prophetic almanacs, or 'Prognostications,' as they were usually called, that James I. gave a monopoly of the trade to the two Universities and the Stationers' Company, under whose patronage, and with the *imprimatur* of the Archbishop of Canterbury, flourished such productions as Lilly's *Merlin's Ephemeris* (1614-81), *Peck Robin's Almanac* (1664-1824), and *Mom's Almanac*, under the editorship of Henry Andrews, which reached an annual sale of more than half a million (1743-1820); yet 'it would be to find, in so small a compass, an equal quantity of ignorance, profligacy, and imposture, as was condensed in these publications.' The memory of Partridge, from 1678 to 1713 the prophet of the Stationers' Company, is preserved in Pope's *Rape of the Lock*, and in Swift's lively burlesque, in which the prophet's own death was predicted. In 1775 a decision of the Court of Common Pleas, in favour of a bookseller named Carnan, abolished the monopoly of the Stationers' Company. In 1779 Lord North brought in a bill renewing their privileges. After a powerful speech against the measure by Erskine, who exposed the pernicious influence of the productions published under the monopoly, it was rejected. The Stationers' Company, however, still maintained their ground by buying up all rival almanacs; and it was not until the publication, in 1828, of the *British Almanac* by the Society for the Diffusion of Useful Knowledge, that the eyes of the English public became opened to the irrational and deleterious nature of the commodity which their own indifference or folly, as much as the selfishness of their purveyors, had hitherto maintained in existence. The success of this admirable publication stimulated the Stationers' Company to publish the *Englishman's Almanac*. The *British Almanac* itself has from 1870 been the principal almanac published by the Stationers' Company. *Whittaker's Almanac* is a valuable compendium of varied information, started in 1869, and enlarged in 1887 to 632 pages.

In Scotland the earliest almanacs seem to have been produced about the beginning of the 16th century. Shortly after the beginning of the 17th century, the almanacs or 'prognostications' published at Aberdeen had begun to enjoy a celebrity which is hardly yet extinct. About 1677 they were sold for a *shilling* each; and the annual circulation amounted, on an average, to 50,000 copies. In 1683 appeared a rival publication, under the title of *Edinburgh's True Almanac, or a New Prognostication*. For a long time the Scottish almanacs continued, like all others of that age, to contain little besides a calendar, with a list of fairs, and what constituted the great attraction: predictions of the weather. But something more instructive and comprehensive became requisite, and the *Edinburgh Almanac* seems to have been among the first to respond to this requirement of advancing civilisation: for, by various additions, such as a list of Scottish members of parliament, it had, in 1745, been extended from the original 16 pages to 36. In twelve years from that date, it had swelled to 72 pages; in 1779 it had reached 252 pages. Since 1837 it has been published under the title of *Oliver & Boyd's New Edinburgh Almanac*, and now extends to above 1000 pages. It contains an amount of information on all public matters, especially on those connected with North Britain, which, in its completeness, leaves little to

be desired. What *Oliver & Boyd's Edinburgh Almanac* is to Scotland, is *Thom's Irish Almanac* (1843) to Ireland—a work not less excellent, and even more extensive.

Of important national almanacs are the French *Almanach Royal*, afterwards *Impérial*, now *National*, begun in 1679, a bulky octavo volume, full of useful information; and the *American Almanac and Treasury of Fact*, a very meritorious publication, started in 1878. The earliest American almanac was published by William Bradford, at Philadelphia, in 1687. Franklin's *Poor Richard's Almanac* (1732-57) may be noticed.

The *Almanach de Gotha*, published annually at Gotha by the great geographical house of Justus Perthes, has a European, or rather a cosmopolitan character. It was begun in 1764, in the German language, in which it was continued until Napoleon I. became emperor, when it was changed to the French language; since the Franco-German war of 1871 it has been published in both tongues. The almanac is a small pocket volume, containing at present more than 1100 pages of small type, and recording the sovereigns and royal families of every civilised country, with the civil, diplomatic, military, and naval officers, a great amount of statistical information, a compact summary of historical events, obituary notices of the most distinguished persons, and other matters of political interest. No book ever printed contains so much political and statistical information in so small a compass. The boundaries of states are given according to the latest treaties, with their extent, population, and revenues. The *annuaire diplomatique* contains the name of every diplomatic representative and attaché of Europe and America. The pay of officers of governments, national expenditures and debts, with the interest, and the number of representatives, are carefully given. When the *Almanach de Gotha* was commenced, there was but one republic in existence, that of Switzerland. It was then little more than a register of the crowned heads and royal families of Europe. It has been slow to recognise political changes, and for years after the French Revolution, continued to print under the head of 'France, Louis XVII., as the reigning monarch. It was not until Napoleon became emperor that his name found a place in its pages, and then his whole family was given, as with the other royal houses. During the Empire, Napoleon I. considered this little publication so important, that he exercised over it a rigid supervision, and in 1808, an entire edition, which had just been worked off, was seized because Anhalt took precedence of Napoleon. To secure this rearrangement of the alphabet, the edition of that year was printed at Paris.

The most important astronomical almanac published in Britain is the *Nautical Almanac*, projected by the astronomer royal, Dr Maskelyne, and first published, with the authority of government, for 1767. After his death it gradually lost its character, and in 1830, in consequence of the numerous complaints made against it, the government requested the Astronomical Society to pronounce upon the subject. The suggestions of the Society were adopted, and in 1834 the first number of the new series appeared, with such additions and improvements as the advanced state of astronomical science rendered necessary. It is issued four years in advance of the year to which it refers. Still older than this almanac is the French *Connaissance des Temps*, commenced in 1679 by Picard, and now published under the authority of the *Bureau des Longitudes*. Its plan resembles that of the *Nautical Almanac*, but it contains a larger amount of original memoirs, many of them of great value. Similar works are the *Berliner Astronomisches*

Jahrbuch (1776), from 1830 till 1862 edited by Eucke, and the *American Nautical Almanac* (1855).

Another kind of almanac, which has especially flourished in Germany and France, belongs rather to the class of publications known in Britain as *Annals* (q.v.). Such have been the *Almanach des Muses, des Dames, Populaire, Teutonique, Napoléonien*, &c., the latter of which were specially devoted to the interests of political and religious parties.

The heavy stamp-duty of fifteenpence per copy, to which almanacs were long liable in the United Kingdom, was abolished in 1831, since which time the character, number, and circulation of this class of publications have strikingly advanced. There is now a very large sale of almanacs in Great Britain for popular use, at not more than one penny each. See CALENDAR, CLOG ALMANAC; a series of articles in *Notes and Queries* (1885); N. Champion's *Ancient Almanachs Illustrated* (1885); and Whitworth's *Churchman's Almanac from 1201 to 2000* (1883).

Almansa, a town of Spain, in the province of Albacete, 60 miles NW. of Alicante by rail. There is a ruined Moorish castle. An obelisk, about a mile distant, marks the spot where the French, under the Duke of Berwick, gained an important victory, on 25th April 1707, over an army of Spanish and English troops. Pop. 7960.

Almansur ('the victorious'), the title assumed by Abū Jafar, the second calif of the house of the Abbasides, who succeeded his brother in 754. Warfare, treachery, murder were his steps to the throne, and his whole rule was as cruel as its beginning. He especially persecuted the Christians in Syria and Egypt. In war against external foes he had but little success, Spain and Africa falling away from the eastern califate. He removed the seat of government from Kufa to Bagdad, which he built (764) at immense cost, raising the money by oppressive taxation. He introduced the pernicious custom of making his freed slaves, mostly foreigners, rulers of provinces. The best feature in his character was his patronage of learning. He caused the *Elements* of Euclid to be translated from the Syriac, and the famous fables of Bidpai from the Persian. Almansur died in 775 during a pilgrimage to Mecca, at the age of almost 70.

Alma-Tadema, LAWRENCE, R.A., a distinguished artist, is a native of the Netherlands, having been born at Dronryp, January 8, 1836, of a very ancient family. Originally destined for the medical profession, it was not until 1852 that he devoted himself to the study of art. In that year he entered the Academy of Antwerp, and subsequently studied under Baron Henry Leys. Obtaining letters of naturalisation as a British subject, he settled permanently in England in 1873. Early in life he had deeply studied Egyptian archaeology and Greco-Roman art, and the results of his oriental investigations are strongly apparent in his works, which are distinguished for their careful composition, their accuracy of design, and the beauty, sobriety, and finish of their colouring. The following works may be cited as perhaps best embodying his æsthetic principles and the general characteristics of his art: 'Entrance to a Roman Theatre' (1866); 'Tarquinus Superbus' (1867); 'A Roman Anatom' (1868); 'Pyrrhic Dance' (1869); 'The Vintage' (1870); 'A Roman Emperor' (1871); 'The Mummy' (1872); 'A Picture Gallery' (1874); 'After the Dance' (1876); 'The Seasons' (1877); 'A Sculptor's Model' (1878); 'Venus Esquilina' (1879); 'The Way to the Temple'—the artist's diploma work for the Royal Academy (1883); 'The Emperor Hadrian visiting a British Potter' (1884); 'An Apolyterium' (1886); and 'The Women of Amphissa' (1887). In 1876 Alma-

Tadema exhibited a series of three pictures at the Grosvenor Gallery—entitled respectively, 'Architecture,' 'Sculpture,' and 'Painting'—and at the same gallery, in 1883, there was a special exhibition of his works. He has also executed several notable works in portraiture. He is probably one of the most decorated men amongst modern artists; he holds Dutch, Belgian, and Bavarian orders, the German order *Pour le Mérite*, and is an officer of the Legion of Honour. Elected R.A. in 1876, he became R.A. in 1879. His second wife is herself an artist of considerable repute. See the Christmas number of the *Art Journal* (1886).

Almeh, ALME, or ALMAI (Arabic *ālim*, 'wise,' 'learned'), a class of Egyptian singing girls in attendance at festivals, entertainments, or funerals. The Ghawazeer, or dancing girls, are of a lower order. See NAUTCH GIRLS.

Almeida, one of the strongest fortified places in Portugal, is situated on the river Coa, on the Spanish frontier, in the province of Beira. In 1762 it was captured by the Spaniards, but soon restored. In 1810 it was defended against Marshal Massena by an English officer, until the explosion of a powder-magazine compelled him to capitulate. Pop. 1680.

Almeida, DON FRANCISCO D', a famous Portuguese viceroy of the Indies, was the seventh son of the Count of Abrantes, and first distinguished himself in the wars with the Moors, but especially at the conquest of Granada in 1492. In 1505 his sovereign, Emanuel I., appointed him viceroy of the Portuguese possessions in the East Indies. On the voyage thither he deposed the king of Quiloa on the Mozambique coast, and, proceeding to Zanzibar, destroyed the town of Mombasa. In the Indian seas he asserted everywhere the superiority of the Portuguese flag, and strove to exclude the Egyptians and Venetians from all commerce with the East. At Cananor, Cochín, Ceylon, and Sumatra, he either built fortresses to protect the factories and commercial interests of his nation, or established new factories. With the king of Malacca, a commercial treaty was formed about the same time. His son, Lorenzo, carried on several expeditions as his father's lieutenant, visited Ceylon, discovered the Maldivé Islands and Madagascar, but soon after was surprised and killed in the port of Chaul, near Bombay. His father speedily took measures to revenge the death of his son upon the hated Mussulmans, when Alfonso d'Albuquerque appeared on the scene (1507), having been sent out by the Portuguese government to supersede Almeida, whom it had begun to distrust on account of his brilliant successes. The latter refused to recognise Albuquerque as viceroy, and for some months kept him prisoner at Cochín. He now sailed along the coasts, burning and plundering various seaports, amongst others Goa, and at length utterly destroyed the Moslem fleet at Diu. From this fierce and avenging expedition he returned to Cochín, resigned his office into the hands of his successor, and set out on his homeward voyage. But he was slain in an encounter with savages at Cape Saldanha, in the south of Africa, March 1, 1510.

Almeria (Arabic *Al-Maryyat*, 'the conspicuous'), the chief town of a Spanish province on the Gulf of Almeria, on the Mediterranean, 120 miles E. of Malaga. It is surrounded by high walls extending from the sea to the hill, has a well-defended harbour, a cathedral, besides 26 churches and monasteries, and a grammar-school. In the time of the Moors, it was, next to Granada, the richest and most important town in the kingdom, with about 150,000 inhabitants, and flourished alike in arts, industry, and commerce, being the great port of traffic with Italy and the

East. At one time it was as terrible a nest of pirates as Algiers itself, under the Moorish chief Ibn Mayman, when even Granada, according to the proverb, was merely its 'farm.' Now, it has only a few trifling manufactures, although it still keeps up considerable trade in grapes, esparto, lead, iron-ore, sulphur, and wine. Pop. (1877) 40,323; (1884) 39,209.—The province of Almería consists of the eastern portion of the ancient kingdom of Granada, and has an area of 3300 sq. m. The soil is rich, and maize, corn, and fruit grow well, but the province is not very prosperous. There are rich mines in the sierras, yielding copper, iron, mercury, silver, and lead. The climate is mild, except in the north. Pop. (1877) 349,076; (1884) 357,570.

Almodóvar del Campo, a town of New Castile, Spain, 22 miles SW. of Ciudad Real. The inhabitants are chiefly employed in agriculture and silver-mining. Pop. 10,362.

Almohades, the name of a Moslem dynasty that ruled in Africa and Spain during the 12th and 13th centuries. The word is Arabic, signifying 'worshippers of the one true God,' and was assumed as a term of distinction. This sect, which at first was religious rather than political, was founded among the Atlas Mountains by Ibn Tumal Abdallah, and in 1146, under the leadership of Abd-ul-Mumen, put an end by the conquest of Morocco to the empire of the Almoravides in Africa, and next extended its career of conquest to Spain. Under Jakub Almansor they won in 1195, at Alarcos, a great victory over the Castilians. In 1210 Mohammed, the successor of Jakub, came with a great army to Spain, but was overthrown in 1212 by the united kings of Castile, Aragon, and Navarre, in the famous battle of Navas de Tolosa, in which it is said that 100,000 Moors were left upon the field. This great defeat was the beginning of the downfall of Moorish power in Spain; its most immediate result was the disappearance of the Almohades from the peninsula. The empire of the Almohades in Africa was brought to an end in 1269, through revolts of the nomadic tribes. See ALMORAVIDES; and Dozy's edition of the History of Abd-ul-Wahid (1847, 2d ed. 1881).

Almond (*Amgdalus*), a genus of the natural order Rosaceæ (q.v.), sub-order Amygdaleæ or Drupaceæ, consisting of trees or shrubs, distinguished by the coarsely furrowed and wrinkled shell (*sarcocarp* or *putamen*) of the drupe, and by



The Almond:
a, flower; b, fruit.

the young leaves being conduplicate, or hinging their sides folded together. According to the greater number of botanists, it includes the Peach (q.v.), constituted by some into a distinct genus, *Persica*, in which the drupe has a fleshy covering (*sarcocarp*), whereas, in the species to which the

name almond is commonly given, this part is a dry fibrous husk, which shrivels as the fruit ripens, and finally opens of its own accord. The almond-tree (*Amgdalus communis*) is very similar to the peach-tree, and is about 20-30 feet high, a native of the East and of Africa, but has now become completely wild in the whole south of Europe. Even in the more northern parts of Germany and of Britain it is planted for the sake of its beautiful flowers, which are produced in great abundance, and resemble those of the peach in form and often in colour, although generally paler and sometimes white. The blossoms appear before the leaves, and are very ornamental in shrubberies in March and April. The wood of the almond-tree is hard, and of a reddish colour, and is used by cabinet-makers. But it is chiefly valued on account of the kernel of its fruit, which forms an important article of commerce. The almond-tree is often referred to in the Old Testament, and the word translated *hazek* is supposed to be another name for the almond. The tree flowers in Palestine in January. The rod of Aaron, mentioned in Numbers xvii., was taken from an almond tree, and it is yet customary with the Jews to strew the roads of all the blossom to

synagogue on festival days. It seems to have been very early introduced into England, and is named in the *Darham Glossary* (11th century) the 'Easterne Nutte Beam.' Its great beauty has made it a favourite with every one wherever it can be successfully grown. Gerard, in Shakespeare's days, says the trees were 'in our London gardens in great plenty;' but Spenser had seen of its beauty before that time. It is only in the most favoured situations in the south of England that it ever produces good fruit. Almonds are either sweet or bitter. The bitter appear to be the original kind, and the sweet to be an accidental variety, perpetuated and improved by cultivation. Sweet almonds contain a large quantity of a very bland, fixed oil, emulsin, gum, and melleage sugar, are of a very agreeable taste, and very nutritious, and are used in the dessert, in confectionery, and medicinally in an emulsion, which forms a pleasant, cooling, diluent drink. Bitter almonds contain the same substances, and, in addition, a substance called *Amgdalin* (q.v.), from which is obtained a peculiar volatile oil. (For the almond *oils*, see the following articles.) The muddy water of the Nile is clarified by rubbing bitter almonds on the sides of the water-vessels, in the same way in which the nuts of the *Stychnos peltatum* (see CLEARING NETS) are used in India. The principal varieties of almond in cultivation are the common *sweet* almond, with thick hard shell; the *brittle-shelled*, with a very thin, almost leathery brittle shell and sweet kernels; the *bitter* almond, with thick hard shell (sometimes also with a brittle shell) and bitter kernels; the *large-fruited*, with large flowers of a whitish rose-colour, and very large, sweet fruit; the *small-fruited*, with very small sweet fruit; and the *peach* almond, with a slightly succulent blackish *sarcocarp* (see above), yellow shell, and sweet kernels. In commerce, the long almonds of Malaga, known as Jordan almonds, and the broad almonds of Valencia, are most valued. Large quantities of almonds are annually imported into Britain and America from France, Spain, Italy, and the Levant; and California produces annually about 2,000,000 lb. Bitter almonds are brought to Britain chiefly from Mogadore. The DWARF ALMOND (*A. nana*) is very similar to the common almond, except that it is a low shrub, seldom more than two or three feet in height. Its fruit is also similar, but much smaller. It is common in the plains of the south of Russia, and is frequently planted as an ornamental shrub in Britain, flowering freely in March and April, but not producing fruit.

Almondbury, to the SE. of Huddersfield, is practically a part of Huddersfield (q.v.).

Almonds. **FIXED OIL OF.** When almonds are subjected to pressure, a fixed greasy oil exudes. Either bitter or sweet almonds may be employed; but the former are generally used, as they are cheaper than the sweet almonds, and the expressed cake is valuable in the preparation of the *essential oil*. 1 cwt. of the almonds generally yields 48 to 52 lb. of the fixed oil. When first obtained, it possesses a turbid or milky appearance; but when allowed to stand at rest, the impurities settle, and a clear, light, yellow oil remains above. It has the specific gravity of $\cdot 920$, and does not solidify till it is cooled to between $+14^{\circ}$ and -5° F. ($+10^{\circ}$ and -20° C.). When fresh it has a mild nutty taste, but soon becomes rancid by exposure to the air; it is not, however, one of the drying oils. It consists almost wholly of *triolein*, a compound of glycerine with oleic acid. The fixed oil of almonds possesses a mild laxative property, and is beneficial also in allaying troublesome coughs.

Almonds. **VOLATILE OIL OF ESSENTIAL OIL OF.** The cake which is left after the expression of the fixed oil from bitter almonds, contains, among other matters, a portion of two substances called, respectively, amygdalin, and emulsin or synaptase. When the cake is bruised and made into a paste with water, the synaptase acts as a ferment upon the amygdalin, splitting it up into the volatile oil of almonds, hydrocyanic (prussic) acid, grape-sugar, ammonia, formic acid, and water. The oil is not originally present in the bitter almonds; in fact, the latter do not contain a trace of the oil ready formed, so that the oil is purely the product of the fermentation of amygdalin, 100 parts of which yield 47 of crude oil. This action takes place very rapidly, and is complete within 24 hours. The paste having been placed in a retort, heat is very cautiously applied, to prevent the lumping and frothing to which the almond infusion is liable. In the distillation, the hydrocyanic acid and the volatile oil unite into an unstable compound, which passes over into the receiver, along with much water. The crude oil thus obtained decomposes gradually, the prussic acid being set free, and on this account it is very poisonous, many fatal cases having occurred from its wilful, accidental, or careless use. The crude oil is purified and freed from prussic acid by means of sulphate of iron and lime. On redistillation, it has a specific gravity of $\cdot 1049$, as compared with $\cdot 1064$ in the crude state, and must be carefully freed from water by being shaken with fused chloride of calcium. The yield of crude essential oil is very variable, ranging from 4 to 9½ lb. from 1000 lb. of bitter almonds, and this again is reduced by about 10 per cent. during its purification from prussic acid. The volatile oil ($C_{10}H_{16}COH$) is the aldehyde of benzoic acid (C_6H_5COOH), into which substance it rapidly changes when exposed to the air in a moist state. It has an agreeable odour, an acid, bitter taste, and burns with a smoky white flame. It is soluble to the extent of 1 part in 30 parts of water, and is very soluble in alcohol and ether. Heated to 356° F. (180° C.), it boils, and distils over unaltered. In medicine, the crude oil used to be employed in place of prussic acid, but its variability in strength has led to its disuse for this purpose. The cook and confectioner employ the oil for flavouring custards, &c., and it forms the basis of several flavouring essences, as ratafia, peach, kernels, &c. For these purposes, none but the oil freed from prussic acid must be used.

Almoner, that functionary of a religious house who had the dispensing of the money and other things set apart for alms, which must, by canon law, amount to at least a tenth of the revenues of

the establishment. Afterwards, those ecclesiastics also received this name who were appointed by princes or bishops to the same office in their households. The Grand Almoner of France was one of the principal officers of the court and of the kingdom, usually a cardinal. Queens, princes, and princesses had also their almoners, and bishops were usually appointed to this office. In England, the office of *Hereditary Grand Almoner* is now a sinecure, his only duty being to distribute the coronation medals among the assembled spectators. The *Lord High Almoner*, who is usually a bishop, distributes twice a year the royal bounty, which consists in giving a silver penny apiece to as many poor persons as the sovereign is years of age.

Almo'ra, the principal town of the British district of Kunmau (q.v.), North-west Provinces of India, 87 miles north from Bareilly, on the crest of a ridge of the Himalayas, 5337 feet above the sea. It was an important centre in the Gurkha-war of 1815. Pop. 8000.

Almoravides (Arabic *al murabithin*, 'dedicated to the service of God'), the name of an Arab dynasty that ruled in Africa and Spain in the 11th and 12th centuries of the Christian era. The sect took its rise about the middle of the 11th century among the Arab and Berber tribes which dwelt on the slopes of the Atlas range facing the Atlantic, and was founded by a Moslem teacher called Abdallah-ben-Yasin. The new proselytes soon exhibited the fruits of his teaching by descending from their hills, under the leadership of a chief named Abubekr, and conquering the kingdom of Fez. The adjoining kingdom of Morocco shared the same fate; and the victorious fanatics, under the famous Yussuf-ben-Tashin, the cousin of Abubekr, next crossed the Strait of Gibraltar, and subdued Spain to the Tago on one side, and to the Ebro on the other. During the reign of Ali, the son of Yussuf, the Almoravides fell before the sect of the Almohades (q.v.), which first expelled them from Africa, and next subdued their power in Spain. It was the Almoravide princes who introduced the *Muracidi* (q.v.) into Spain, and in that and the word *Murabiths* (q.v.) their name is still preserved. See Dozy, *Histoire des Musulmans d'Espagne* (4 vols. 1861).

Almqvist, KARL JONAS LUDVIG, a Swedish author, was born at Stockholm in 1793, and died in 1866 at Bremen, after a singular career, in which one had to flee to America, where he became Abraham Lincoln's secretary. His works, a selection from which fills 4 vols. (1875), included his masterpiece, *Torquatus Ind.*, and other poems, besides novels, plays, and historical, critical, and philosophical writings.

Alms-house. An alms-house is a house or set of houses in which accommodation is provided for persons disabled by age and poverty. Many philanthropists think that persons of this class are best provided for by means of pensions, which enable them to live with their friends; but the alms-house was a form of charity frequently preferred in old times by testators who desired to leave a visible memorial of their bounty. Great abuses formerly prevailed in some of these institutions. In some, persons of good position were received, and the intrusion of a poor man or woman was resented by the inmates. In others (as, for instance, in the Hospital of St Cross at Winchester), the master appropriated the whole of a great revenue, except what was required to carry out the letter of the founder's will. Abuses of this kind were checked by the appointment of a permanent Charity Commission in 1853. In Scotland, alms-houses generally bear the name of Hospital (q.v.).

Almug Tree, or ALGUM TREE. This name, occurring in the Old Testament, was formerly supposed to denote a species of acacia, or a coniferous tree like the yypress; but it is now thought more probable that it was one of the kinds of Sandalwood (q.v.), the *Santalum album*, a native of India.

Almuñecar, a seaport town of Andalusia, Spain, 33 miles S. of Granada, with trade in cotton, sugar, and fruit. Pop. 8794.

Almus. See ALDER.

Alnwick ('town on the Alne'), the county town of Northumberland, 38½ miles N. by W. of Newcastle by rail. It is a well-built place, with a large central market-place, a spacious town-hall, and a corn-exchange of 1862. Alnwick was at an early period a fortified town, and one of its four gates remains, with fragments of the walls. At the north entrance of the town stands Alnwick Castle, the seat originally of the De Vescis, and since 1310 of the House of Northumberland (see PERCY). It has been sumptuously restored since 1854 in the Italian palazzo style, and is one of the most magnificent baronial structures in England. During the middle ages, it was a bulwark against the invasions of the Scots, and it was thrice besieged by Malcolm Canmore, who here met his death; by David I., who captured it; and by William the Lion, who here was taken prisoner. Alnwick ceased in 1886 to enjoy certain prescriptive municipal usages it formerly possessed. Pop. (1871) 5822; (1881) 6691. See a supplement to the *Graphic* for August 9, 1884.

Aloe (*Alou*), a genus of plants of considerable medicinal importance, belonging to the natural order Liliaceæ (q.v.), sub-order Aloineæ. There are about 200 species, of which 170 are indigenous to the Cape Colony. The species all have stems, but vary in height from a few inches to 30 feet. They have permanent succulent leaves. The negroes of the west coast of Africa make cords and nets of the fibres of their leaves, and stockings are woven from the fibres of a species found in Jamaica. But aloes are chiefly valuable for their medicinal properties. The well-known drug called Aloes (see below) is the inspissated juice of the leaves of several almost tree-like species, and particularly of *A. socotrina*, *pernyi*, *purpurascens*, *spirata*, *furcata*, *arabica*, *A. calycina* is found in the East and West Indies, in Italy, and in some of the islands of the Mediterranean, being the only species which can be reckoned European, although it also is probably an introduced plant. The *Amarant. Alou* is a totally different plant (see AGAVE). The *aloes* of the Bible was the wood of a tree (see next article). The juice of aloes was anciently used in embalm-

colour is obtained from the leaves of the Socotrine aloes, which also affords a fine transparent colour for miniature painting.

ALOES is a drug of great antiquity, for we find it mentioned by Dioscorides (50 A.D.). Till modern times, the source of the drug was the island of Socotra, but at present it is imported from various parts of the world. The chief varieties are distinguished by colour, smell, and fracture, and in the London market are: *Socotrine aloes*—derived from the *Aloe pernyi*, not from the *Aloe socotrina*, which was till recently believed to be the source of the drug; *Barbadoes aloes*; *Cape aloes*; and *Natal aloes*.

These various forms of the drug are derived from several species of aloes, but they all agree in possessing a bitter taste, and having powerful purgative properties. Active principles, similar in nature but differing in composition, are found in the three chief varieties. These are Socaloin, $C_{15}H_{16}O_2$, found in Socotrine aloes; Nataloin, $C_{16}H_{18}O_2$, found in Natal aloes; Barbaloïn, $C_{17}H_{20}O_2$, found in Barbadoes aloes.

When employed in small doses as extract, tincture, pills, or otherwise, aloes exerts a tonic, and in larger doses, a cathartic action.

Aloes Wood (sometimes called also Eagle Wood, Calambue, Paradise Wood, or Agallochum) is the heart-wood of *Aquilaria araba* and *A. Agallochum*, trees of the order Aquilariaceæ, natives of the tropical parts of Asia, and supposed to be the aloes or lign-aloes of the Bible. They are large spreading trees. Aloes wood contains a dark-coloured, fragrant, resinous substance, and is much prized in the East as a medicine, and for the pleasant odour which it diffuses in burning. The resinous substance is found only in the inner part of the trunk and branches; the younger wood is white, and almost scentless; hence the pure aloes wood is sometimes obtained by burying the stems, when the sap-wood decays away, leaving the resinous core intact. A similar substance, still more esteemed, is obtained in the south-eastern parts of Asia and the adjacent islands, from the central part of the trunk of *Alcockia Agallochum*, of the natural order Leguminosæ, sub-order Gesalpiniæ. This tree is found in Cochin China and the Moluccas, where a character of sacredness is attached to it. Its fragrant wood is not only much prized in the East as a perfume, but many medicinal virtues are ascribed to it. The ancients ascribed to it similar virtues, and so valued it for these and its fragrance, that Herodotus says it once sold for more than its weight in gold. As it admits of a high polish, and exhibits a beautiful graining, precious gems were set in it; and it was cut into fantastic forms and worn in head dresses, &c. It was early used to perfume apartments, and Napoleon I. used it as a perfume in his palaces. The fragrance continues undiminished for years. *Lign Aloes* is a corruption of *Lignum Aloes* (aloes wood).

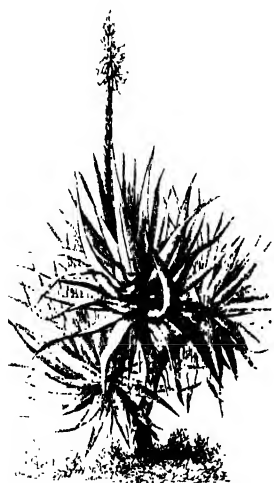
Alope'cia (Gr., 'fox-mange'), the technical term for Baldness (q.v.).

Alopecurus. See FOXTAIL.

Alo'ra, a town of Spain, in the province of Malaga, 23 miles NW. of Malaga by rail. There are ruins of an ancient castle. Pop. (1877) 10,014.

Alo'sa. See CLUPEDIE and SHAD.

Alost, or AALST, a town in Belgium, the old capital of the province of East Flanders, on the Dender, a navigable tributary of the Scheldt, 19 miles NW. of Brussels by rail. It has trade in hops, corn, besides silk, linen, and woollen manufactures, breweries, distilleries, copper and iron foundries. The church of St Martin, an unfinished edifice, is one of the grandest in Belgium, with a



Aloe socotrina

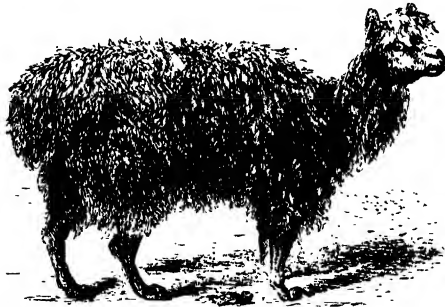
ing, to preserve dead bodies from putrefaction. In the East Indies, it is employed as a varnish to prevent the attacks of insects. A beautiful violet

famous painting by Rubens—'St Roche beseeching our Saviour to stay the Plague of Alost,' and also the mausoleum of Marten, a native of Alost and Belgium's first printer (1473). Alost has also a 13th-century town-hall with a beautiful belfry, and a Jesuit college. Pop. (1886) 22,431.

Aloysia. See VERBENA.

Alpaca (*Auchenia Paco*), an animal of the same genus with the Llama (q.v.), and belonging to the Camel family of Ruminants. It is the half-domesticated form of the wild vicuña. It is remarkable for the length and fineness of the wool, which is of a silken texture, and of an uncommonly lustrous, almost metallic appearance. The alpaca is smaller than the llama; the legs and breast are destitute of callosities. In form it somewhat resembles the sheep, but has a longer neck and more elegant head. It carries its long neck erect; its motions are free and active, its ordinary pace a rapid bounding canter. The eyes are very large and beautiful. The wool, if regularly shorn, is supposed to grow about six or eight inches in a year; but if allowed to remain upon the animal for several years, attains a much greater length, sometimes even thirty inches, and not infrequently twenty. Its colour varies; it is often yellowish brown; sometimes gray, or approaching to white; sometimes almost black.

The alpaca is a native of the Andes, from the equator to Tierra del Fuego, but is most frequent



Alpaca.

on the highest mountains of Peru and Chili, almost on the borders of perpetual snow, congregating in flocks of one or two hundred. In a wild state, it is very shy and vigilant; a sentinel on some elevated station snorts to alarm the flock on the approach of danger. Alpacas seem instinctively to know when a storm is coming on, and seek the most sheltered situation within their reach. Flocks, the property of the Peruvian Indians, are allowed to graze throughout the whole year on the elevated pastures, and are driven to the huts only at shearing-time. When one is separated from the rest, it throws itself on the ground, and neither kindness nor severity will induce it to rise and advance alone. It is only when brought to the Indian huts very young, that they can be domesticated so as to live without the companionship of the flock; but then they become very bold and familiar. Their habits are remarkably cleanly.

The Indians have from time immemorial made blankets and ponchos or cloaks of alpaca wool. It is fifty years since it became an article of commerce, and its use for the manufacture of shawls, coat-linings, cloth for warm climates, umbrellas, &c. has gradually increased, and more than 2,000,000 lb. are now annually imported into Britain. The credit of introducing and raising to its present magnitude the alpaca wool manufacture in Britain,

which has still its chief seat at Saltaire, is due to Sir Titus Salt.

Attempts have been made to introduce the alpaca into Europe; but not yet with very satisfactory results. The only considerable flock known to exist is in the Pyrenees. There seems no reason, however, to doubt that the mountains of Wales and Scotland are suitable for this branch of husbandry; and it is to be hoped that enterprise such as has been directed to the manufacture of alpaca wool in Britain, will soon, and with equal success, be directed to the production of it. There are probably not more than two or three hundred alpacas in Britain, and these mostly in parks connected with the residences of noblemen and gentlemen, not in the situations for which they seem to be peculiarly adapted. An attempt was made in 1821 to introduce the alpaca into the United States; in 1857 a cargo of them was shipped to Baltimore, but the result showed that they could not be acclimated.

Alpaca wool is straighter than that of the sheep, very strong in proportion to its thickness, and breaks little in combing. The fibre is small, and it is very soft, pliable, and elastic. The flesh of the animal is said to be very wholesome and pleasant.

Alp-Arslan, a Persian sultan, the second of the Seljuk dynasty, born in Turkestan in 1029. In 1059 he ascended the throne of Khorassan, and in 1063, on the death of his uncle, became monarch of all Persia. He embraced Islamism, taking the name of Mohammed; and by his bravery obtained the surname of Alp Arslan, 'Brave Lion.' In 1067 and 1068 he took and plundered the city of Casarea, in Cappadocia. In 1064 he invaded Armenia and Georgia, at that time Christian kingdoms, and added them to his dominions. In 1068 he marched against the Greeks of the Eastern empire, who, under the Emperor Romanus Diogenes, had thrice driven back the Turks beyond the Euphrates. In 1071 a blood battle was fought, the Seljuks gaining a decisive victory. The Greek emperor was taken prisoner, and only obtained his liberty by an enormous ransom and a large annual tribute. Marching to the conquest of Turkestan in 1072, the sultan perished by the dagger of a captive enemy.

Alpena, an American port-town, at the mouth of Thunder Bay River, in Michigan, with foundries and numerous saw-mills. A large quantity of timber sawn in this district is shipped at this port. Pop. (1880) 6153; (1884) 9210.

Alpes is the name of three departments in France. That of Basses-ALPES occupies the N.E. part of Provence, and is the most sparsely populated in all France. It is, for the most part, mountainous, consisting of spurs or offshoots from the Maritime Alps, which run in numerous chains towards the Rhone. In the north, the climate is cold, the soil poor, and the cultivation bad; in the south, the climate is much better, almonds, apricots, peaches, and various other choice fruits are grown. The wines are excellent. The mines produce lead, green marble, &c. At Digne and Gréoul there are mineral springs. The department is watered by the Durance. The area of the department is 2680 sq. m.; pop. (1886) 129,494. The chief town is Digne.

The HAUTES-ALPES, lying north of the Basses-Alpes, and forming a part of the old province of Dauphiné, is traversed by the chief range of the Cottian Alps, which here rise, in Mount Pelvoux, to the height of 14,000 feet. The scenery, especially along the course of the impetuous Durance, is singularly picturesque. The *Hautes-Alpes* is, after Savoy, the highest department in France; the fierce north wind and the perpetual snow on the lofty peaks make the climate severe and the winter long, so that the barren soil will yield

little else than potatoes, a little rye, oats, and barley, although thick forests clothe the mountain-sides. The area is 2158 sq. m.; pop. (1886) 122,924. The mines produce lead, copper, iron, and anthracite. Every autumn, some four or five thousand people leave the colder heights to seek employment during the winter months in the lower department. Chief town, Gap.

ALPES MARITIMES, a department in the extreme SE., on the shores of the Mediterranean and confines of Italy, was formed in 1860. It is made up of the ancient county of Nice, which was ceded in that year to France, and of the arrondissement of Grasse. The chain of the *Alpes Maritimes* forms the northern boundary of the department, and from it numerous spurs run seaward, among which are lovely and fertile valleys. The climate is mild and pleasant in the vicinity of the sea, and in the lower valleys, although the higher mountains reach to altitudes where winter always reigns. The vine and olive are much cultivated in the more favoured localities; tobacco, oranges, lemons, and figs are produced; and much land is devoted to the cultivation of herbs and flowers for the preparation of essences and perfumes. Grasse is particularly famous for the manufacture of perfumery. The silkworm is reared, and honey is largely produced and exported. There are some mineral springs. The tunny, anchovy, and sardine fisheries are important. The capital is Nice (q.v.), and the other principal towns are Antibes, Villefranche, Cannes, Grasse, and Menton or Mentone. The area is 1482 sq. m.; pop. (1886) 238,057.

Alphabet, so called from *alpha* and *beta*, the first two Greek letters, is the name given to a set of graphic signs, called letters, denoting elementary sounds, by the combination of which words can be visibly represented. Nearly 200 alphabets, ancient and modern, are known, of which about 50 are now in use. They are all developments from the primitive Phœnician alphabet, which was itself ultimately derived from the Egyptian hieroglyphic picture-writing. The alphabet is thus the oldest existing monument of civilisation, since its genesis can be traced back to the earliest Egyptian dynasties.

All writing was in its origin pictorial. It began with ideograms, which developed into phonograms. Ideograms are pictures or symbols intended to represent either things or abstract ideas. Phonograms are the graphic symbols of sounds. They are either verbal, standing for entire words; or syllabic, denoting the articulations of which words are composed; or alphabetic, representing the elementary sounds into which syllables are resolved.

Five independent systems of ideographic writing have been invented: (1) The Cuneiform, which arose in the valley of the Euphrates, and developed into the Achemœnian syllabaries. (2) The Chinese, out of which the Japanese syllabaries have arisen. (3) The Hittite, which was the probable source of the Cypriote syllabary. (4) The Mexican picture-writing. (5) The Egyptian hieroglyphics, from which the Phœnician alphabet was derived.

Merely mnemonic records, such as the wampum belts of the North American Indians, the quipus of Peru, or the totemistic marks on the grave-stones of semi-barbarous tribes, can hardly be dignified with the name of writing, and need not be further noticed; while the Cuneiform, the Chinese, and the Egyptian scripts will be treated of under their proper headings (see CUNEIFORM, CHINESE, and HIEROGLYPHICS).

To give even the briefest account of every known alphabet would require a volume. All that can be here attempted is to show how the Phœnician, the mother of all other alphabets, arose out of the

Egyptian picture-writing, and to explain the affiliation of a few of the more important daughter alphabets, such as the Hebrew, the Syriac, the Arabic, the Indian, the Greek, and last, but not least, the Roman alphabet which we ourselves employ.

The Egyptian hieroglyphic picture-writing may be traced back, by means of inscriptions, for more than six thousand years, to the time of the second Egyptian dynasty, when it already appears in great perfection, arguing a long period of antecedent development. It consisted of pictorial ideograms, which, at some unknown epoch, must have given birth to verbal phonograms, some of which came to be used as syllabic signs. Of the 400 Egyptian phonograms, about 45 attained an alphabetic character—that is, they either denoted vowels, or could be associated with more than one vowel-sound. Out of these alphabetic signs our own letters have grown. But though the Egyptian hieroglyphic writing contained the germs of the alphabet, it was not truly alphabetic. It remained to the last partly ideographic, partly phonetic. Alphabetic and syllabic signs are conjoined with verbal phonograms, and these are explained by means of pictorial ideograms. The transition to a pure alphabetic writing was only made when the Phœnicians borrowed the art of writing from the Egyptians. The supreme merit of the Phœnicians was that they rejected, once for all, the unnecessary portions of the complicated Egyptian system, the ideograms, the verbal phonograms, and the syllabic signs, and selected from the 45 variant symbols of elementary sounds a single sign for each of the 22 consonants which are found in Semitic speech. To ourselves the notion of alphabetic writing seems extremely simple, but in reality the passage from ideographic picture-writing to a pure alphabet is one of the greatest triumphs of the human mind, having been effected only once in the whole history of the world. None of the other systems of picture-writing, Chinese, Cuneiform, or Hittite, advanced beyond a more or less perfect stage of syllabism.

To a French scholar, M. de Rongé, belongs the honour of having demonstrated the true origin of the alphabet. Several classical writers, including Plato, Diodorus, Plutarch, and Tacitus, had stated in general terms the belief or tradition of the ancient world, that the Phœnicians had obtained the alphabet from Egypt, while in modern times not a few attempts had been vainly made to derive the several Phœnician letters from suitable hieroglyphic pictures. But it was only in 1859 that De Rongé pointed out that the prototypes of the Phœnician letters must be sought, not in the hieroglyphics of the monuments, but in certain cursive 'hieratic' or priestly characters, so extremely ancient that they had already fallen into disuse at the time of the Hebrew exodus. This form of hieratic writing is known to us almost exclusively from a single manuscript, the Papyrus Prisse, as it is called, which was found in a tomb belonging to the eleventh dynasty, and is therefore much older than the shepherd kings.

In the Papyrus Prisse, the characters bear hardly more resemblance to the hieroglyphs from which they were derived than they do to the earliest known forms of the Phœnician letters, the chief difference being due to the fact that the Egyptian was a cursive script, used for writing on papyrus; while the Phœnician letters are lapidary characters, adapted for engraving on stone. Hence straight lines are substituted for flowing curves, and sharp angles for rounded forms.

De Rongé shows, letter by letter, how twenty-one of the most suitable of the Egyptian characters were selected from the rest, and taken over; only one new letter, *ayin*, the source of our *a*, having

EGYPTIAN	PHOENICIAN	GREEK			LATIN			HEBREW
		A	Α	α	A	Α	α	א
		B	Β	β	B	B	b	ב
		Γ	Γ	γ	Γ	Γ	γ	ג
		Δ	Δ		Δ	Δ	δ	ד
	𐤀	Ε	Ε		Ε	Ε	ε	ה
	𐤁	Υ	Υ	Υ	Υ	Υ	υ	ו
	𐤂	Ζ	Ζ	ζ	Ζ	Ζ	z	ז
	𐤃	Η	Η	η	Η	Η	h	ח
	𐤄	Θ	Θ	θ				ט
11	𐤅	Ι	Ι	ι	Ι	Ι	i	י
	𐤆	Κ	Κ	κ	Κ	Κ	k	כ
12	𐤇	Λ	Λ	λ	Λ	Λ	l	ל
13	𐤈	Μ	Μ	μ	Μ	Μ	m	מ
14	𐤉	Ν	Ν	ν	Ν	Ν	n	נ
15	𐤊	Ξ	Ξ	ξ	Ξ	Ξ	x	ס
	𐤋	Ο	Ο	ο	Ο			ש
	𐤌	Π	Π	π	Π	Π	p	
18	𐤍	Ρ	Ρ	ρ	Ρ	Ρ	r	ר
19	𐤎	Σ	Σ	σ	Σ	Σ	s	ש
20	𐤏	Τ	Τ	τ	Τ	Τ	t	ת
21	𐤐	Υ	Υ	υ	Υ	Υ	υ	
22	𐤑	Φ	Φ	φ	Φ	Φ	φ	
	𐤒	Χ	Χ	χ	Χ	Χ	χ	
	𐤓	Ψ	Ψ	ψ	Ψ	Ψ	ψ	
	𐤔	Ω	Ω	ω	Ω	Ω	ω	
	𐤕	Α	Α	α	Α	Α	α	
	𐤖	Β	Β	β	Β	Β	β	
	𐤗	Γ	Γ	γ	Γ	Γ	γ	
	𐤘	Δ	Δ		Δ	Δ	δ	
	𐤙	Ε	Ε		Ε	Ε	ε	
	𐤚	Υ	Υ	Υ	Υ	Υ	υ	
	𐤛	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐤜	Η	Η	η	Η	Η	h	
	𐤝	Θ	Θ	θ				
	𐤞	Ι	Ι	ι	Ι	Ι	i	
	𐤟	Κ	Κ	κ	Κ	Κ	k	
	𐤠	Λ	Λ	λ	Λ	Λ	l	
	𐤡	Μ	Μ	μ	Μ	Μ	m	
	𐤢	Ν	Ν	ν	Ν	Ν	n	
	𐤣	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐤤	Ο	Ο	ο	Ο			
	𐤥	Π	Π	π	Π	Π	p	
	𐤦	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐤧	Σ	Σ	σ	Σ	Σ	s	
	𐤨	Τ	Τ	τ	Τ	Τ	t	
	𐤩	Υ	Υ	υ	Υ	Υ	υ	
	𐤪	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐤫	Η	Η	η	Η	Η	h	
	𐤬	Θ	Θ	θ				
	𐤭	Ι	Ι	ι	Ι	Ι	i	
	𐤮	Κ	Κ	κ	Κ	Κ	k	
	𐤯	Λ	Λ	λ	Λ	Λ	l	
	𐤰	Μ	Μ	μ	Μ	Μ	m	
	𐤱	Ν	Ν	ν	Ν	Ν	n	
	𐤲	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐤳	Ο	Ο	ο	Ο			
	𐤴	Π	Π	π	Π	Π	p	
	𐤵	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐤶	Σ	Σ	σ	Σ	Σ	s	
	𐤷	Τ	Τ	τ	Τ	Τ	t	
	𐤸	Υ	Υ	υ	Υ	Υ	υ	
	𐤹	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐤺	Η	Η	η	Η	Η	h	
	𐤻	Θ	Θ	θ				
	𐤼	Ι	Ι	ι	Ι	Ι	i	
	𐤽	Κ	Κ	κ	Κ	Κ	k	
	𐤾	Λ	Λ	λ	Λ	Λ	l	
	𐤿	Μ	Μ	μ	Μ	Μ	m	
	𐥀	Ν	Ν	ν	Ν	Ν	n	
	𐥁	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐥂	Ο	Ο	ο	Ο			
	𐥃	Π	Π	π	Π	Π	p	
	𐥄	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐥅	Σ	Σ	σ	Σ	Σ	s	
	𐥆	Τ	Τ	τ	Τ	Τ	t	
	𐥇	Υ	Υ	υ	Υ	Υ	υ	
	𐥈	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐥉	Η	Η	η	Η	Η	h	
	𐥊	Θ	Θ	θ				
	𐥋	Ι	Ι	ι	Ι	Ι	i	
	𐥌	Κ	Κ	κ	Κ	Κ	k	
	𐥍	Λ	Λ	λ	Λ	Λ	l	
	𐥎	Μ	Μ	μ	Μ	Μ	m	
	𐥏	Ν	Ν	ν	Ν	Ν	n	
	𐥐	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐥑	Ο	Ο	ο	Ο			
	𐥒	Π	Π	π	Π	Π	p	
	𐥓	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐥔	Σ	Σ	σ	Σ	Σ	s	
	𐥕	Τ	Τ	τ	Τ	Τ	t	
	𐥖	Υ	Υ	υ	Υ	Υ	υ	
	𐥗	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐥘	Η	Η	η	Η	Η	h	
	𐥙	Θ	Θ	θ				
	𐥚	Ι	Ι	ι	Ι	Ι	i	
	𐥛	Κ	Κ	κ	Κ	Κ	k	
	𐥜	Λ	Λ	λ	Λ	Λ	l	
	𐥝	Μ	Μ	μ	Μ	Μ	m	
	𐥞	Ν	Ν	ν	Ν	Ν	n	
	𐥟	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐥠	Ο	Ο	ο	Ο			
	𐥡	Π	Π	π	Π	Π	p	
	𐥢	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐥣	Σ	Σ	σ	Σ	Σ	s	
	𐥤	Τ	Τ	τ	Τ	Τ	t	
	𐥥	Υ	Υ	υ	Υ	Υ	υ	
	𐥦	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐥧	Η	Η	η	Η	Η	h	
	𐥨	Θ	Θ	θ				
	𐥩	Ι	Ι	ι	Ι	Ι	i	
	𐥪	Κ	Κ	κ	Κ	Κ	k	
	𐥫	Λ	Λ	λ	Λ	Λ	l	
	𐥬	Μ	Μ	μ	Μ	Μ	m	
	𐥭	Ν	Ν	ν	Ν	Ν	n	
	𐥮	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐥯	Ο	Ο	ο	Ο			
	𐥰	Π	Π	π	Π	Π	p	
	𐥱	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐥲	Σ	Σ	σ	Σ	Σ	s	
	𐥳	Τ	Τ	τ	Τ	Τ	t	
	𐥴	Υ	Υ	υ	Υ	Υ	υ	
	𐥵	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐥶	Η	Η	η	Η	Η	h	
	𐥷	Θ	Θ	θ				
	𐥸	Ι	Ι	ι	Ι	Ι	i	
	𐥹	Κ	Κ	κ	Κ	Κ	k	
	𐥺	Λ	Λ	λ	Λ	Λ	l	
	𐥻	Μ	Μ	μ	Μ	Μ	m	
	𐥼	Ν	Ν	ν	Ν	Ν	n	
	𐥽	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐥾	Ο	Ο	ο	Ο			
	𐥿	Π	Π	π	Π	Π	p	
	𐦀	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐦁	Σ	Σ	σ	Σ	Σ	s	
	𐦂	Τ	Τ	τ	Τ	Τ	t	
	𐦃	Υ	Υ	υ	Υ	Υ	υ	
	𐦄	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐦅	Η	Η	η	Η	Η	h	
	𐦆	Θ	Θ	θ				
	𐦇	Ι	Ι	ι	Ι	Ι	i	
	𐦈	Κ	Κ	κ	Κ	Κ	k	
	𐦉	Λ	Λ	λ	Λ	Λ	l	
	𐦊	Μ	Μ	μ	Μ	Μ	m	
	𐦋	Ν	Ν	ν	Ν	Ν	n	
	𐦌	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐦍	Ο	Ο	ο	Ο			
	𐦎	Π	Π	π	Π	Π	p	
	𐦏	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐦐	Σ	Σ	σ	Σ	Σ	s	
	𐦑	Τ	Τ	τ	Τ	Τ	t	
	𐦒	Υ	Υ	υ	Υ	Υ	υ	
	𐦓	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐦔	Η	Η	η	Η	Η	h	
	𐦕	Θ	Θ	θ				
	𐦖	Ι	Ι	ι	Ι	Ι	i	
	𐦗	Κ	Κ	κ	Κ	Κ	k	
	𐦘	Λ	Λ	λ	Λ	Λ	l	
	𐦙	Μ	Μ	μ	Μ	Μ	m	
	𐦚	Ν	Ν	ν	Ν	Ν	n	
	𐦛	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐦜	Ο	Ο	ο	Ο			
	𐦝	Π	Π	π	Π	Π	p	
	𐦞	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐦟	Σ	Σ	σ	Σ	Σ	s	
	𐦠	Τ	Τ	τ	Τ	Τ	t	
	𐦡	Υ	Υ	υ	Υ	Υ	υ	
	𐦢	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐦣	Η	Η	η	Η	Η	h	
	𐦤	Θ	Θ	θ				
	𐦥	Ι	Ι	ι	Ι	Ι	i	
	𐦦	Κ	Κ	κ	Κ	Κ	k	
	𐦧	Λ	Λ	λ	Λ	Λ	l	
	𐦨	Μ	Μ	μ	Μ	Μ	m	
	𐦩	Ν	Ν	ν	Ν	Ν	n	
	𐦪	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐦫	Ο	Ο	ο	Ο			
	𐦬	Π	Π	π	Π	Π	p	
	𐦭	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐦮	Σ	Σ	σ	Σ	Σ	s	
	𐦯	Τ	Τ	τ	Τ	Τ	t	
	𐦰	Υ	Υ	υ	Υ	Υ	υ	
	𐦱	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐦲	Η	Η	η	Η	Η	h	
	𐦳	Θ	Θ	θ				
	𐦴	Ι	Ι	ι	Ι	Ι	i	
	𐦵	Κ	Κ	κ	Κ	Κ	k	
	𐦶	Λ	Λ	λ	Λ	Λ	l	
	𐦷	Μ	Μ	μ	Μ	Μ	m	
	𐦸	Ν	Ν	ν	Ν	Ν	n	
	𐦹	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐦺	Ο	Ο	ο	Ο			
	𐦻	Π	Π	π	Π	Π	p	
	𐦼	Ρ	Ρ	ρ	Ρ	Ρ	r	
	𐦽	Σ	Σ	σ	Σ	Σ	s	
	𐦾	Τ	Τ	τ	Τ	Τ	t	
	𐦿	Υ	Υ	υ	Υ	Υ	υ	
	𐧀	Ζ	Ζ	ζ	Ζ	Ζ	z	
	𐧁	Η	Η	η	Η	Η	h	
	𐧂	Θ	Θ	θ				
	𐧃	Ι	Ι	ι	Ι	Ι	i	
	𐧄	Κ	Κ	κ	Κ	Κ	k	
	𐧅	Λ	Λ	λ	Λ	Λ	l	
	𐧆	Μ	Μ	μ	Μ	Μ	m	
	𐧇	Ν	Ν	ν	Ν	Ν	n	
	𐧈	Ξ	Ξ	ξ	Ξ	Ξ	x	
	𐧉	Ο	Ο	ο	Ο			
	𐧊	Π	Π	π	Π	Π</		

with them the Aramean script used in the valley of the Euphrates. After the 1st century B.C. this alphabet developed into two branches: the northern, which became the parent of the Syriac alphabets; and the southern, which developed into the square Hebrew. This only assumed its present style about the 12th century, and is thus one of the most modern of existing alphabets, and not, as was formerly believed, the most ancient of all. The Hebrew vowel-points date from about the 7th century. The Syriac arose out of a form of the Northern Aramean alphabet, locally employed at Edessa, which was a great seat of Christian learning. The older form of Syriac, which enshrines an important Christian literature, is called the E-stranghelo. This developed into a more curious style called the Peshito, which is still used by the Christians of Aleppo. A curious descendant of the Syriac alphabet is the Mongolian, which arose indirectly out of the heresy of the Nestorians, who, being condemned by the Council of Ephesus in 431 A.D., took refuge in Persia, whence their missionaries penetrated into the remotest parts of Asia, carrying with them their alphabet, which became the parent, on the one hand, of the Karshuni, used by the Christians of St Thomas on the Malabar coast of India, and, on the other, of the Mongolian, Kalmyck, and Manchu alphabets, which stretch intermittently across Northern Asia from the Volga to the Sea of Japan. Prior to the extension of Mohammedanism, the Mongolian was the official alphabet of the vast empire of Genghis Khan, and was used in Khiva and Bokhara, which now employ the Arabic. The Mongolian is written in vertical columns, from the top to the bottom of the page, instead of from right to left, like the Syriac, Arabic, and Hebrew.

In the valley of the Euphrates, the Aramean alphabet gradually exterminated the cumbrous Cuneiform script, and became the parent of the Iranian family of alphabets, which are known chiefly from the coins and inscriptions of the Parthian and Sassanian kings who ruled Persia from the 3d century B.C. to the Mohammedan conquest in the 7th century A.D., when Arabic became the script of Persia. The old Persian or Pehlvi writing was taken to India by fugitives from Islam, and is still used by the Parsees, or fire-worshippers of Bombay, for their sacred books.

In the 5th century A.D. the western or Arsacidan form of the Pehlvi alphabet, which is akin to the Palmyrene alphabet used in the inscriptions of Zenobia, was reformed and adapted to the use of the Armenians by St Mesrob, who also constructed the Georgian alphabet out of the eastern or Sassanian form of the Pehlvi writing. But the most interesting offshoot of the Iranian alphabet was the Bactrian, which, before the conquests of Alexander, extended over the eastern provinces of the Persian realm to Merv, Herat, and Bokhara, and even reached the Punjab, which formed the Indian satrapy of the empire of Darius. The chief monument of the Indo-Bactrian alphabet is the long inscription engraved on a rock near Peshawar by Asoka, the great Buddhist emperor, who reigned in the 3d century B.C.; but it can be traced by means of the coins of the Indo-Scythian kings nearly to the close of the 1st century A.D. It has left a curious survival in the numerals which we ordinarily use. These, which we call the Arabic ciphers, are really of Indian origin, having been brought from India by the Arabs, and introduced by them into Spain, whence, during the 12th and 13th centuries, they spread over Europe, gradually replacing the more clumsy Roman numerals. Thus our cipher 5 is the Indo-Bactrian letter *p*, the initial of the Sanskrit word *panchan*, five (cf. Greek *πέντε*). Our 4 is the letter *ch*, the initial of the Sanskrit *chatvar*,

four (cf. Latin *quattuor*), and 7 is an *s*, the initial of *saptan*, seven. Few things in the history of the alphabet are more curious than the fact, first discovered by Dr Isaac Taylor, that the numeral signs of Europe and America are the letters of an obscure alphabet introduced into India 2400 years ago as a consequence of the conquests of Darius.

The Iranian alphabets of Central Asia were suddenly exterminated by the Arabic, whose rapid diffusion was one of the most remarkable results of the spread of Islam. It extends from Morocco to Sumatra, from Bokhara to Zanzibar, and, with some trilling modifications, it has been adapted to express the sounds of languages as diverse as Arabic, Turkish, Persian, Pushtu, Beluchi, Hindustani, and Malay.

THE GREEK, HEBREW, AND ARABIC ALPHABETS.

Α	Alpha	Α	Alph	ا	Alif
Β β	Beta	ב	Beth	ב	Be
Γ γ	Gamma	ג	Gimel	ג	Te
Δ δ	Delta	ד	Daleth	ד	The
Ε ε	Epsilon	ה	He	ה	Jim
Ζ ζ	Zeta	ו	Van	ו	Hha
Η η	Eta	ז	Zayin	ז	Kha
Θ θ	Theta	ח	Cheth	ח	Dal
Ι ι	Iota	ט	Teth	ט	Dzal
Κ κ	Kappa	י	Yod	י	Re
Λ λ	Lambda	כ	Kaph	כ	Ze
Μ μ	Mu	ל	Lamed	ל	Sin
Ν ν	Nu		Mem	מ	Shin
Ξ ξ	Xi		Nun	נ	Sad
Ο ο	Omicron		Samekh	ס	bad
Π π	Pi	ע	Ayin	ע	Ta
Ρ ρ	Rho	פ	Pe	פ	Za
Σ σ ς	Sigma	צ	Tsade	צ	Ain
Τ τ	Tau	ק	Qoph	ק	Ghain
Υ υ	Upsilon	ר	Resh	ר	Fe
Χ χ	Chi	ש	Shin	ש	Qaf
Ψ ψ	Psi	ת	Tau	ת	Kef
Ω ω	Omega			ל	Lam
				מ	Mim
				נ	Nun
				ס	He
					Waw
				י	Ye

As the square Hebrew and the Syriac arose out of the local alphabets of Jerusalem and Edessa, so the Arabic, next after the Latin the most important alphabet in the world, was originally only the local alphabet of Mecca. It has two forms: the Kufic, a monumental script now almost disused; and the Neskhî, which is the cursive Arabic in ordinary use.

There were two early alphabets in Arabia. The Arabic is descended from the Nabathean, an Aramaean alphabet of Northern and Central Arabia, known to us chiefly from inscriptions, dating from the 1st to the 5th century A.D., engraved on the rocks of Petra and Sinai. On the other hand, numerous inscriptions, some as old as the 2d century B.C., chiefly from the neighbourhood of Aden, show that a very different alphabet, called the Sabeen or Himyaritic, was employed in Arabia Felix. It seems to have been derived from the alphabet of Tyre, and may probably have been obtained as early as the time of Hiram. Carried to the opposite coast of Africa, it became the parent of the alphabets of the Abyssinian Christians, called the Ethiopic and the Amharic, in which new letters have been added, and their order and some of their names changed, while the alphabet has been converted into a syllabary.

But the chief interest of the Sabeen alphabet arises from its having become the parent of the modern scripts of India, which comprise more than half of the existing alphabets. We have already seen that an Aramaean alphabet was introduced into the Punjab through Afghanistan about 500 B.C., but this was ultimately replaced by an offshoot of the alphabet of Yemen, which, about the same time, must have been brought to the ports of Western India by Arabian merchants. From the inscriptions of Asoka, the Constantine of India, whose edicts, engraved on rocks and pillars, extend across the whole breadth of India from Gujarat to Orissa, we obtain a knowledge of the ancient type of the Indian alphabet. In the hands of the early Indian grammarians it became the most perfect scientific alphabet of the world. Consisting of forty-two letters—thirty-three consonants and nine vowels—it is capable of expressing the most delicate gradations of the Sanskrit sounds.

The developments of the primitive Indian alphabet may be traced, by means of inscriptions, from the time of Asoka, in the 3d century B.C., to the 10th century A.D., when the prototypes of the present provincial alphabets of India had established themselves. The existing vernacular alphabets divide themselves into four well-marked groups: (1) The Pali, or Buddhist, comprising alphabets used in Ceylon, Burma, Siam, Pegu, Cambodia, Java, and Cochin. (2) The Nagari, or Hindi, of which an old form is used for Sanskrit books, and to which belong the local alphabets of Northern India, including those of Bengal, Kashmir, Nepal, Tibet, Gujarat, and the Punjab. (3) The Dravidian, used in Southern India, of which the Tamil and Telugu are the chief varieties. (4) The Malay, used in Celebes, the Philippines, and Sumatra.

The alphabet of Southern Arabia, the parent of the numerous Indian scripts, branched off from the Phœnician stem about the 10th century B.C., a date which must also be assigned to a still more important offshoot of the Phœnician. This was the Hellenic branch, the source of the alphabets of Europe and America. A Greek legend refers the introduction of the alphabet to Cadmus, the Tyrian. Cadmus is an eponymic name, meaning in Semitic speech 'the man of the East.' Herodotus tells us that Cadmus landed first at Thera, an island in which the oldest Greek inscriptions have been found. But this legend is a very small portion of the evidence for the Phœnician origin of the Greek alphabet. It is established by the forms of the letters, which in the oldest Greek inscriptions do not differ appreciably from those in early Phœnician records; by the order of the letters, which is the same in the Greek and Phœnician alphabets; and also by their names, which are significant Semitic words, though meaningless in Greek. Thus Alpha

is the Semitic *aleph*, an ox; Beta is *beth*, a house; Gamma is *gimel*, a camel; Delta is *daleth*, a door; Epsilon is *he*, a window; Eta is *cheth*, a fence; Theta is *teth*, a serpent; Iota is *yod*, a hand; Kappa is *kaph*, the palm of the hand; Lambda is *lamed*, an ox-goad; Mu is *mem*, the waters; Nu is *nun*, a fish; O-micron is *'ayin*, an eye; Pi is *pe*, the mouth; Rho is *resh*, the head; and Tau is *tan*, a mark or cross.

A knowledge of alphabetical writing must have been obtained by the Greeks from the Phœnician trading settlements in the Ægean, as early as the 10th century B.C. At the date of the oldest Greek inscriptions which are extant, three vowels, *alpha*, *epsilon*, and *omicron*, had already been evolved out of the Phœnician breaths, *aleph*, *he*, and *'ayin*, and two, *iota* and *upsilon*, from the semi-consonants *yod* and *van*. The forms of the letters had undergone hardly any change, and the direction of the writing is still retrograde, from right to left, as in the Semitic scripts. Somewhat later, the direction is *hysteroalphabetic*, or 'ploughwise,' the lines proceeding alternately from right to left, and from left to right, just as the plough draws the alternate furrows in opposite directions. Before the close of the 7th century, the more convenient plan of writing all the lines from left to right was adopted.

By the middle of the 6th century, the Greek alphabet had in all essential respects attained its final development. The letters had assumed the forms of the Greek capitals with which we are familiar; two additional vowels had been evolved, *eta* from *cheth*, and *omega* from *omicron*; *phi* had been differentiated out of *theta*, *chi* out of *kappa*, and *psi* probably out of *phi*; while *F*, *Q*, and *S*, descended from *van*, *yoph*, and *tsadeh*, were disused as letters, though they were still retained as numerals. About the 3d century B.C. the lapidary characters, which correspond to the capitals in Greek printed books, began to be replaced by more rounded forms which are called uncials, while cursive forms were used for correspondence. Finally, between the 7th and 9th centuries A.D., the minuscules, which are the small letters of our printed Greek books, were evolved from a combination of uncials and cursives.

The foregoing account refers to the Ionian alphabet, which grew up on the coasts of Asia Minor, and was adopted as the alphabet of Athens in 403 B.C. But the Greek alphabet, from a very early time, shows a tendency to separate into two types—the Eastern or Ionian, which became the classical alphabet of Greece; and the Western or Chalcidian, which was the source of the alphabet of Italy. The chief differences between the two are those which still distinguish our own from the Greek alphabet. In the Western alphabet, *F* and *Q* were retained; *H* continued to be a breath, instead of developing into a vowel; and the forms of *L*, *r*, *p*, *x*, *s*, became *L*, *R*, *P*, *X*, *S*, instead of *A*, *P*, *H*, *Z*, *S*.

The primitive alphabet of Italy, from which our own is derived, belonged to the Western Greek type. As early, probably, as the 9th century B.C., it was carried by the Chalcidians of Eubœa to Cumæ, near Naples, which was a colony of Chalcids. It became the parent of five local Italian alphabets—the Oscan, the Etruscan, the Umbrian, the Faliscan, and the Latin. Owing to the political supremacy of Rome, the Latin ultimately displaced the other national scripts of Italy, and became the alphabet of the Roman empire, and afterwards of Latin Christendom, thus spreading over Western Europe, America, and Australia, and becoming the dominant alphabet of the world; its only rival as a cosmopolitan script being the alphabet of the Koran.

Curiously enough, this, the most modern of alphabets, has adhered more closely than any

other to the primitive Phœnician type. Of the Phœnician letters, the Greek alphabet discarded three and added five, while the Latin has only discarded two and added three. Its archaic character is shown by the use of the older forms, *L* and *S*, instead of *λ* and *Σ*, and by its retention of the older value of *H*, and of the letters *F* and *Q*, which the Greek alphabet has lost. But it lost *φ*, *χ*, and *θ*, as letters, whose Western forms, however, are retained as the Roman numerals, *M*, *L*, and *C*.

At the time of the early empire, the Romans employed two forms of their letters: capitals for inscriptions; and for business and correspondence, degraded cursive forms, which are known to us chiefly from *graffiti* scribbled by schoolboys on the walls of Pompeian houses. These two Roman scripts are respectively the sources of our own printed capitals, and of our printed minuscules or small types. Out of the Roman cursive, the Irish semi-uncial was developed as a book-hand about the 6th century A.D. Through Scotland it was introduced into Northumbria by Irish monks, and became the basis of the beautiful Caroline minuscule, so called because it arose in the reign of Charlemagne, in the calligraphic school at Tours, founded by Alcuin of York.

Owing to its intrinsic merits, consisting in its legibility, and the ease with which it could be written, the Caroline minuscule rapidly became the book-hand of Europe; but, after the 12th century, it began to degenerate into the black letter, which was imitated in the types of the earliest printers, and is still retained in German books. The Roman printers, however, reverted to the better Caroline forms, which now go by the name of 'Roman type.' These types were brought to Paris in 1470, and fifty years later to England, where they displaced the black letter which had been previously used.

The wide difference existing between the forms of our capital and smaller letters is thus explained. We have, in fact, two alphabets, both dating from the 1st century A.D., in concurrent use. Thus the forms *a*, *b*, *c*, *r*, *g*, *m*, *h*, are derived from the old Roman cursive, while *A*, *B*, *D*, *R*, *G*, *M*, *H*, are the Roman capitals. In *d*, the loop of *D* has been transferred from the right to the left of the vertical stroke; in *g*, two new loops have been formed, the little crook at the top being all that remains of *G*; in *h*, the upper loop of *B* opened out, and ultimately disappeared; in *r*, the loop and tail of *R* have undergone nearly complete atrophy; while in *f*, the tick to the left is all that remains of the lower curve of *S* (see table on p. 187).

In our own alphabet, the order of the letters does not differ very greatly from the Phœnician arrangement, but the few changes are historically instructive. The last Phœnician letter was *t*, which in our alphabet is followed by six letters, *u*, *e*, *o*, *a*, *i*, *y*. Of these, *u* dates from the 9th century B.C., having been differentiated by the Greeks out of *F*, and placed after *t*, the last of the old letters. Originally, *u* and *e* were only the medial and initial forms of the same letter. In the 10th century A.D. the first came to be used for the vowel, and the second for the consonant, because in Latin words the consonant usually occurs at the beginning, and the vowel in the middle of words, and the two forms were regarded as separate letters, and placed side by side in the alphabet. So also with *w*, which arose in the 11th century as a ligature, like *ss*, *ff*, or *xx*, the ligature for *ct*. It was originally written *en*, and then *er*, out of which *W* arose. These new forms were squeezed in, so to speak, between *u*, the last of the old Greek letters, and *X*, the last of the original Latin letters. The letter *x* was developed out of *sumekh* (*s*), about the 7th century B.C., and

was placed at the end of the old Latin alphabet. In the time of Cæsar, the Romans borrowed *Y* from the Greek alphabet, to denote the sound of *upsilon*, and placed it at the end of the alphabet after *X*. Soon afterwards, *Z* was also borrowed from the Greek alphabet and placed after *Y*. It was introduced into the English alphabet from the French in the 15th century, being only used in English, as in Latin, to spell words of foreign origin. The letters *I* and *J*, like *U* and *V*, were the medial and initial forms of the same letter; but since the consonantal sound usually occurs at the beginning of words, and the vowel-sound in the middle, *J* was conveniently appropriated in the 15th century for the consonant, and *I* for the vowel. The dot of *j*, which is needless, is a mere survival, showing that the two forms were differentiated after the practice of dotting the *i* had come into vogue. In the 11th century, the letter was accented, *i*, for convenience, when it came next to *u*, *o*, or *a*; in the 14th, the accent was changed to a dot; and it was only in the 15th that the dot became universal. In the Latin and English alphabets, the seventh letter is *g*; while in the Phœnician, as well as in the Greek, the seventh letter is *z*. We have already seen why *z* was removed to the end of the alphabet. The third letter originally had the value of *g*, but its symbol, *Γ*, came in Latin to have both sounds, *c* and *g*. This was inconvenient, and the form *G* was differentiated out of *Γ*, to denote the latter sound, and was transferred in the 3d century B.C. to the seventh place, hitherto occupied by *z*, which had fallen out of use, not being required for Latin words, and was only reborrowed two hundred years later for the transliteration of Greek words.

The Anglo-Saxons adopted into their alphabet two of the Runes, *þ*, called *æcen*, for *v*, and *ƿ*, called *thorn*, for *th*. The first was disused after the invention of *W*, but the other is still occasionally employed by old-fashioned people, who write 'ye' for 'the,' the Y-shaped letter being merely a survival of the *thorn* Rune, ultimately a derivative of the Greek *delta*.

Our letters are named on the same principle as in the Latin alphabet. The vowels are called by their sound; the consonants, by the sound of the letter combined with the easiest vowel, which, for convenience of utterance, precedes the continuants and follows the explosives. Thus we have *cf*, *cl*, *cm*, *cn*, *cr*, *cs*, but *bc*, *dc*, *gc*, *pc*, *tc*, because *cf* is easier to pronounce than *fc*, while, on the other hand, *bc* is easier than *cb*. The letters *k*, *h*, *q*, and *x*, which are pronounced further back, are each combined with the appropriate back vowel, for facility of pronunciation. The name of *z* is an exception to the rule. We call it *zed* and not *cz*, because the letter, with its Greek name *zeta*, was introduced into the Latin alphabet from the Greek after the Latin letters had acquired the names by which we know them.

The Greek alphabet was the source, not only of the Latin, but of the other national alphabets of Europe. The Runes, which formed the alphabet of the Scandinavian nations, were based on early forms of a Greek letters, which, as Dr Isaac Taylor has shown, were obtained about the 6th century B.C. from Greek colonies on the Black Sea, by Gothic tribes who then inhabited the region south of the Baltic (see RUNES). The Oghams, used in the earliest inscriptions of Wales and Ireland, seem to have been based upon the Runes (see OGHAMS). The Moso-Gothic alphabet was constructed by Uphilas in the 4th century, by a combination of the Runes and the contemporary Greek uncials. The Coptic alphabet, used in Egypt, was also derived from the Greek uncials of the 4th century A.D., with six additional characters

borrowed from the Egyptian Demotic, a cursive script derived from the hieroglyphic writing. The Slavonic alphabets, of which the Russian is the most important, were obtained from the 9th-century Byzantine uncial, with some additional characters derived from ligatures employed in the Greek cursive writing. The obscure Albanian alphabet is merely a debased form of minuscule Greek. See also LETTERS, WRITING.

The standard work on the subject is Dr Isaac Taylor's book on *The Alphabet* (2 vols. 1883). The reader may also consult *L'Alphabet Phénicien*, by F. Lenormant; *Das Griechische Alphabet*, by Kirchhof; Gardthausen's *Griechische Paläographie*; Wattenbach's *Leitfaden*; Ballhorn's *Alphabet*; Faulmann's *Buch der Schrift*, and other books referred to in Dr Taylor's work.

Alpheus (*Rufia*) is the chief river of Peloponnesus (Morea), rising in the SE. of Arcadia, and flowing past the famous Olympia westwards into the Ionic Se. In its passage through Arcadia, a country consisting of cavernous limestone, it repeatedly disappears under ground and rises again. With this fact was connected a remarkable myth. The river-god Alpheus was said to have become enamoured of the nymph Arethusa while bathing in his stream. To escape him, she prayed to Artemis, who changed her into a fountain, and opened up an underground passage for her to Ortygia, a small Sicilian island in the harbour of Syracuse. The river still pursued the nymph, passing from Greece to Sicily below the sea, without mingling his water with it, and appearing in the spring that bubbles up by the shore, close by the fountain of Arethusa.

Alphonsine Tables. See ALFONSO X.

Alphonso. See ALFONSO.

Alpine Club. De Saussure, in virtue of his ascent of Mont Blanc (August 1787), and the published account thereof, may be looked upon as the father of mountaineering. For many years, however, climbing was almost confined to this peak, and the amusement was little appreciated. Albert Smith, who ascended Mont Blanc in 1851, stimulated public curiosity, but the real development came with the formation of the Alpine Club in 1857, and the publication of *Peaks, Passes, and Glaciers* in 1859. Mountaineering, then at once sprang into fashion. Nor was this to be wondered at. Practically, a new pleasure had been invented—health-giving and adventurous. The Alps were easily accessible, and the natives of the country were so far civilised, that the traveller who could put sufficient money in his purse had nothing to fear. The first pioneers of the Alps were explorers and geographers, rather than climbers; but, as was only natural, the high mountains soon began to attract, and many found pleasure in climbing for its own sake. The natives of the alpine valleys, speaking generally, were expert mountaineers, and a race of instructors was therefore ready to hand. Gradually mountaineering as an art began to develop, and gradually the real began to be dissociated from the imaginary dangers of the Alps; for beyond question, a certain amount of risk was run, but it was found that this could be minimised by experience and acquired skill. It is no exaggeration to say that the first accident on the Matterhorn, in 1865, did much to popularise the amusement, which only needed the advertisement of a little hostile criticism. Cavillers questioned what the pleasure might be; and hinted that vanity was at the bottom of it. The Alpine Club itself furnishes one answer, for it numbers nearly 500 members, including men of the most varied tastes and pursuits in life, whom probably no other bond on earth, save the fascination of mountaineering, could have united together. The charm is very

composite in its nature. The mere healthiness of the pursuit, no doubt, attracts many. Again, there is always pleasure in overcoming natural difficulties by acquired skill; and the feeling that by doing a thing in the right way, real risks can be to a great extent abolished, is in itself alluring. As an illustration, may be instanced the use of the rope, especially on snow mountains. If three persons were to walk up such mountains as Mont Blanc or the Jungfrau without using the rope, or without using it properly, they would be in continual peril; united together at intervals of ten or twelve feet, an accidental slip would have no evil consequences, and the party would be perfectly safe from all dangers of crevasses. Mountaineering has opened up what would otherwise be the *terra incognita* of the regions above the snow-line, with all their wild beauty and grandeur, and has made them accessible to the many. Since the foundation of the Alpine Club, the death rate from mountain accidents has been 3·8 lives per annum; but in 1887 eight lives were lost above the snow-line.

But still there are real dangers, which cannot be wholly eliminated even by the most skilful climber. The mountaineer who refuses to recognise that such is the case, runs the greatest risk of all. No man takes proper precautions who undertakes an expedition which, under favourable conditions, is only just within his powers. Unexpected difficulties may occur, and the climber who has no reserve to draw upon, is at every instant in grave peril; and so too are all the members of his party. Some knowledge and judgment of the weather are indispensable. The easiest mountain may become most formidable in a storm or a gale of wind. But for those who have the courage of their opinions, and are not afraid to turn back and abandon a half-completed expedition, or who decline to start under unfavourable conditions, bad weather need have little terror. The risk of avalanches is greatest in the spring and winter, and least in the summer months, when the Alps are chiefly visited. Experience alone will teach a man where and at what time of day, on any particular mountain, avalanches are most prone to fall. On rock mountains, and these attract chiefly on account of their greater variety, there is, on the whole, perhaps, less risk to run, though bad weather is equally formidable. The rope is less valuable, but it is less needed, since the climber has hand as well as foothold. Falling stones constitute a real but still a much exaggerated danger. The difficulties of descending a peak are, broadly speaking, as great but not greater than those of ascending; but men are apt to become careless when the main object of an expedition is achieved, and directly inattention creeps in, the risk begins. Mountain vertigo is much rarer than is commonly imagined. The climber is not perpetually walking along the edge of unfathomable precipices. Probably but few members of the Alpine Club could stand on the edge of a parapet, and look down a height of say 100 feet, without feeling uncomfortable, and yet they may have ascended most of the great peaks of the Alps, without ever having experienced any sensation of the sort. No doubt the moral support of the rope accounts in part for this, but the real fact is that there are few places in the Alps where the climber's nerves are tried as in the imaginary position pictured.

Of the special equipment required, the most essential items are reliable boots, properly nailed. A man unsuitably shod runs more risk in walking alone over a steep dry grass slope, than in climbing the Matterhorn, provided he has a sufficiency of practised guides, is properly equipped, and is in good condition. The use of the ice-axe or of the

alpenstock has to be learned like that of the oar or the cricket bat—by practice. The most efficient plan, after all, of guarding against the real dangers of the Alps, consists in employing only thoroughly competent and trustworthy guides; yet it must be borne in mind that guiding too is an art, and it by no means follows because a man is an expert climber, that he is fit to take charge of a party. Though much has been done to raise the standard of guides, and to insure that only thoroughly reliable men shall be qualified to act as such, there is still room for great improvement. The temptation to adopt a comparatively lucrative profession is a great one for the peasants, and notwithstanding all rules and regulations, there are many so-called guides on the registers who are by no means perfectly reliable. Such men, under ordinary conditions, may get through their work well enough, but it is only under specially trying conditions that the first-rate guide shows his value. In selecting guides for difficult expeditions, the advice of competent judges should always be taken.

The idea of founding the Alpine Club originated with Mr William Mathews. The *Alpine Journal*, by members of the club, published quarterly, began in 1863. Members are elected by ballot, if their qualifications, whether climbing, literary, artistic, or scientific, have been previously approved by the committee. Among the more famous first ascents made by members of the Alpine Club may be mentioned those of the Matterhorn (Whymper, 1865); the Schreckhorn (Stephen, 1861); Ellbuz in the Caucasus (Froshfield, Grove, 1868, 1874); Cotopaxi and Chimborazo in the Andes (Whymper, 1880); Mount Cook, New Zealand (Green, 1882). An Austrian Alpine Club was founded in 1862; and was followed by Swiss (1863), Italian (1863), and German associations (1869), counting their members by thousands. The German and Austrian societies united in 1874, and had in 1884 above 13,000 members. Climbing is not the sole or main purpose of the continental associations; they devote themselves largely to the scientific investigation of the Alpine area. Mountaineering clubs exist in other mountain regions; thus there is in Boston, U.S., an 'Appalachian Mountain Club.' See Ball's *Alpine Guide (Eastern Alps, 1868; Central Alps, 1870; Western Alps, 1870)*; Tyndall's *Mountaineering* (1861) and *Hours of Exercise in the Alps* (1873); Whymper's *Scribbles among the Alps* (1871).

Alpine Plants. This appellation is given not only to those plants which are found at elevations approaching the limit of perpetual snow in the Alps of Central Europe, but also to plants belonging to other mountainous regions in any part of the world, whose natural place of growth is near snows that are never melted even by the beams of the summer's sun. As the elevation of the snow line, however, varies very much in different countries, according to the latitude, and also from peculiar local circumstances, the term Alpine Plants is not so much significant of the elevation of the habitat, as of the average temperature which prevails there. On the Andes, near the equator, at an elevation of 12,000 to 15,000 feet above the level of the sea, many kinds of plants are found, of humble growth, resembling in their general appearance those which occur in Germany and Switzerland at an elevation of 6000 feet; and these again either resemble, or are even identical with, the species which in Lapland grow up a hill of very little elevation, or which, in the northern parts of Siberia, are found at the level of the sea. Similar plants occur also in the Himalaya Mountains, at elevations varying remarkably within very narrow geographical limits from local causes, which also create great differences in the general dryness

or humidity of the atmosphere. The laws of this natural distribution of plants have been in our own day for the first time investigated and elucidated by Humboldt, Wahlenberg, Schouw, De Candolle, and others, and form the most essential part of a branch of science still in its infancy—phytogeography (see GEOGRAPHICAL DISTRIBUTION). When the alpine plants of Central Europe are spoken of, those are meant which grow at an average height of 6000 feet, marking what, in the language of distributional science, is called the alpine zone. This, on its northern limit, the Riesengebirge, falls as low as 4000 feet, and rises, in the southern Alps and Pyrenees, to an elevation of 9000 feet, and sometimes even above it. Although very rich in forms peculiarly its own, this zone contains many plants which are likewise found on much lower hills, and even in the plains. The number of these, however, diminishes as the elevation increases. Hence the small spaces clear of snow in the highest regions possess a very characteristic flora, the plants of which are distinguished by a very low diminutive habit, and an inclination to form a thick turf, frequently, also, by a covering of woolly hairs, whilst their stems are very often either partly or altogether woody, and their flowers are in proportion remarkably large, of brilliant colours, and in many instances very odoriferous, upon which accounts they remarkably attract and please the occasional visitors from the plains. In the Alps of Central Europe, the eye is at once caught by gentians, saxifrages, rhododendrons, and various species of primrose, as well as by the rarer edelweiss—*Anaphalium (Leontopodium) alpinum*. With these and other phanerogamous plants are associated a number of delicate ferns and exceedingly beautiful mosses. The highest mountains in Scotland exhibit a somewhat similar flora, and beautiful plants, both phanerogamous and cryptogamous, are found on them, which never appear in lower situations, as the Alpine Speedwell (*Fernandea alpina*), the small Alpine Gentian (*Gentiana nivalis*), the Rock Scorpion Grass, or Alpine Forget-me-not (*Myosotis alpestris*), *Azalea procumbens*, *Woodsia ilicensis* and *hyperborea*, &c. Many alpine plants are limited to a very small district. Thus, the flora of Switzerland differs considerably from that of Germany, the latter being now known to contain 3400 phanerogamous plants, of which the former contains 2200, and along with them also 126 species which have hitherto been found only in the Swiss Alps. There are, moreover, particular species of plants which are found only in single localities, as *Hypericum coris*, upon the Wiggis Mountains in the canton of Glarus; *Wulfenia carinthiaca*, upon the Küweger Alp, in Upper Carinthia; and many others. There are, however, many species which, occurring on the mountains of Central Europe, appear also in those of Britain and Scandinavia at lower altitudes, but are not found in the intervening plains. The colonies of alpine plants on mountain tops, which were the sole remnants of the arctic-alpine flora of glacial period, which saved themselves at low latitudes by retreating to the heights upon the disappearance of cold climatic conditions from the low grounds. Cryptogamic plants are generally found in alpine regions in much greater abundance than elsewhere. Their great beauty, even when dried, makes them favourites with those plant collectors who have amusement more in view than the mere interests of science. Small herbaria of them are offered for sale everywhere in Switzerland; and in some places large collections have been prepared and thrown open to the public. The introduction of alpine plants into our gardens was formerly attended with difficulty, and success in establishing

them was limited; but thanks to improved facilities in travelling, the extension of rapid means of communication, and, above all, to the dissemination of correct views of the requirements of these beautiful wildlings under cultivation, there is now nothing to prevent our having the alpine flora of the world well and fully illustrated in our gardens. In fact, the progress that has been made, since about 1870, in introducing and successfully establishing species that were prior to that time considered incapable of existing out of their own peculiar habitats, is perhaps the most remarkable achievement of modern gardening art. The specially important collections in our leading botanical gardens are becoming yearly more rich in new species, by importation from their native wilds; and many of those that have been some time under cultivation, are developing varieties with distinctive characteristics of feature and constitution—a sure sign that the plants are tractable and amenable to the circumstances of cultivation. The number of private collections of alpine plants in England has greatly increased also within the past few years, and nurserymen are devoting more attention to their culture, showing that taste in flower-gardening is strongly tending in a more intellectual and satisfying direction, to all who take an interest in the art. The rich variety in colour and form, and the strongly-marked individuality that may be introduced into every flower-garden by employing freely these lowly but brilliant inhabitants of alpine regions in its embellishment, will mark a new era in English flower-gardening. Many alpine flowers, especially edelweiss and the alpine rose, threaten to become extinct in their native haunts, and in 1887 the government of Valais made inclosures for the protection and cultivation

of these plants. See Sutherland's *Alpine and Herbaceous Plants*; Robinson's *Alpine Plants*; Hartinger's *Atlas der Alpenflora* (4 vols. 1882).

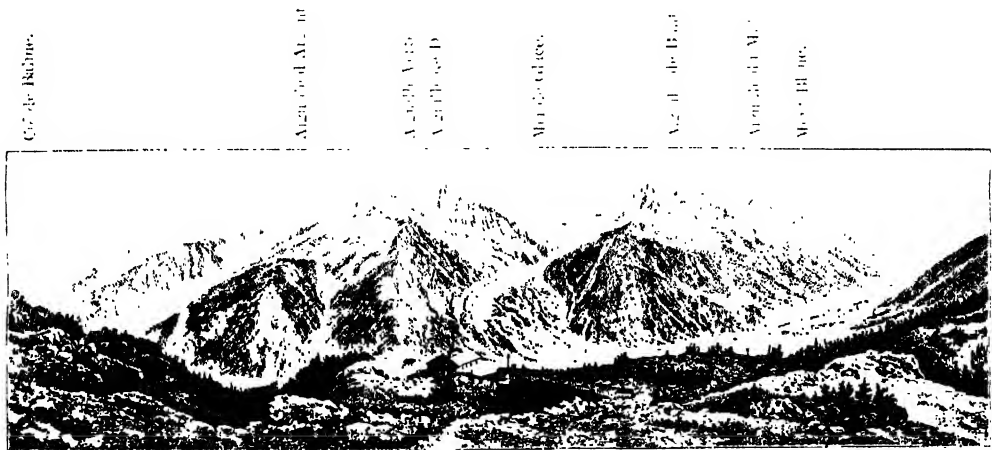
Alpini. See BERSAGLIERI.

Alpin'ia. See GALANGALE.

Alpnach. or ALPNACHT, a Swiss village, in the canton of Unterwalden, at the foot of Mount Pilatus, 1½ miles from that part of Lake Lucerne called Lake Alpnach. It is known principally on account of its celebrated 'slide,' now disused, which was 8 miles long, and by means of which timber was brought from the forests of Mount Pilatus to the village. Pop. 1679.

Alps (possibly a Celtic word meaning 'high'; cf. Gaelic *alp*, 'a high mountain'; or connected with Lat. *albus*, 'white'), the most extensive system of lofty mountains in Europe, raising their giant masses on a basis of 90,000 sq. m., between 6° 40' and 18° E. long., and extending in some places from the 44th to the 48th parallel of latitude. The Alpine system is bounded on the N. by the hilly ground of Switzerland and the upper plain of the Danube; on the E., by the low plains of Austria; on the S., by the Adriatic Sea, the plains of Lombardy, and the Gulf of Genoa; and on the W., by the plains of Provence and the valley of the Rhone. A string of lakes encircles both the northern and southern bases of these mountains, the former at an elevation of 1200 to 2000 feet; the latter, 600 to 700 feet. The varied natural scenery of France, Italy, Germany, and Austria has a common centre of union in this lofty region. Valleys open out in all directions, sending their melted snows on one side into the North Sea, on another into the Black Sea, and on another into the Mediterranean.

The *water-system* of the Alps may be thus briefly



The Chain of Mont Blanc from the Flegère across the Valley of Chamouni.

sketched: (1) In the basin of the Rhine, there is the Rhine itself, which partly forms the Lake of Constance, at the north-eastern extremity of Switzerland, and receives on the left the important tributaries of the Thur and the Aar; the latter of which flows through Lakes Brienz and Thun, and is itself augmented by various affluents, the largest of which are the Reuss and the Limmat. (2) In the basin of the Danube there flow from the south the Iller, Lech, Isar, and the Inn. Still farther east, the Danube has for its tributaries the Traun, the Enns, the Raab, the Drave, and the Sava, the last three of which have their sources in the extreme Eastern Alps. (3) In the basin of the Po, there

are numerous streams which rise in the Southern Alps; the principal of these are the Dora Baltea, the Ticino from Lake Maggiore, the Mincio from Lake Garda, and the Adige. (4) In the basin of the Rhone, there are the Rhone (flowing through the Lake of Geneva), and various Alpine tributaries, the most important of which are the Arve, the Isère, and the Durance. (5) The Var is the principal Liguian coast-stream; the Piave, and the Tagliamento, the largest of those which fall into the Adriatic from the Southern Alps.

Divisions. In order to give a clear view of the manifold ranges of this mountain-land, a distinction is generally made between the East, the West, and

the Middle Alps; the last of which is again divided into a northern, central, and southern chain; while a natural separation by river-valleys into groups is also made. I. WEST ALPS. The principal ranges of these are: (1) The Maritime Alps, extending from the middle Durance southwards to the Mediterranean, and rising in the Aiguille de Chambeyron to a height of 11,155 feet. (2) The Cottian Alps, north of these, whose highest summit, Monte Viso, is 12,605 feet. (3) The Dauphiné Alps, separated by the valley of the Durance from the Cottian; their highest summit is the Pic des Ecrins, 13,462 feet. (4) The Graian Alps, forming the boundary between Savoy and Piedmont, and attaining in the Grand Paradis, an elevation of 13,300 feet. II. MIDDLE ALPS. *Central Chain.*—(1) The Pennine Alps, between the plains of Lombardy and the valley of the Rhone. Highest summits: Mont Blanc, 15,732 feet; Monte Rosa, 15,151 feet. (2) The Lepontian or Helvetic Alps, from the depression of the Simplon, along the plateau and masses of St Gothard, to the pass of Mont Splügen. (3) The Rhetian Alps, between the Inn, the Adula, and the Upper Adige. *Northern Chain.*—(1) The Bernese Alps, between the Rhone and the Aar. Highest summits: Finsteraarhorn, 14,926 feet; Aletschhorn, 13,803; Jungfrau, 13,671 feet. (2) The Alps of the Four Forest Cantons, the Schwyz Alps, &c. *The Southern Chain.*—(1) The Ötztal Alps, between the Adula and the Adige. (2) The Tricentine Alps, between the Adige and the Piave. III. EAST ALPS.—The principal chains of these are: (1) The Noric Alps, between the plains of the Drave and the Danube. (2) The Carnian Alps, between the Drave and the Save. (3) The Julian Alps, between the Save and the Adriatic Sea.

A comprehensive classification leads to a division of the elevations into three regions: (1) The lower range forming the buttresses of the main masses, and reaching a height of 2000 to 6000 feet; that is, to the extreme limit of the growth of wood. (2) The middle zone lying between the former limit and the snow-line at the elevation of 8000 to 9000 feet. (3) The high Alps, rising to 15,732 feet. The middle zone forms the region of mountain-pasturages, where the characteristic Alpine dairy farming is carried on. These pastures consist of a rich carpet of grass and flowers. This threefold division of heights, however, does not everywhere coincide with the same phenomena of vegetation: the line of perpetual snow descends lower on the north side, and the boundaries of the zones above described vary accordingly. (1) The line of demarcation between the region of mosses and alpine plant; and that of perpetual snow, is from 8000 to 9000 feet on the northern declivities; but on the southern, it approaches 10,000 feet. (2) The highest limit to which wood attains on the north is about 6000 feet, while on the south it is nearly 7000 feet. (3) Grain, beech, and oak, on the north, disappear at the elevation of 4000 feet; on the south, they contrive to exist some hundreds of feet higher. (4) The region of the vine, as well as of maize and chestnuts, extends to an elevation of 1900 feet on the northern declivity; and on the southern declivity to 2500 feet. The ranges of outlying lower mountains which flank the high central Alps on the north, east, and west, are mostly wanting on the south, especially where the Middle Alps descend into the plains of Lombardy. Thus the Alps rise in steep rocky precipices from the level of the flat plains of the Po, whilst they sink more gradually into the plains on the north; hence their mighty masses, closely piled together, present an aspect from the south more grand and awful; from the north, more extended and varied.

Valleys.—The depth of the valleys, and their variety as to form and arrangement, are not less

striking than their elevations. Most worthy of notice is the characteristic form of the wide longitudinal valleys that lie at the foot of the high central chains. On the east side, they open directly into the plain; on the north, they are connected with the plain through transverse valleys which often end in lakes. The transverse valleys on the south side are mostly in the shape of steep rocky ravines, forming in some parts long-stretching lakes. Besides the deep-sunk principal valleys, there are extensive series of basin-shaped secondary valleys, which are the scenes of Alpine life, properly so called. Many of the Alpine valleys have names distinct from the rivers flowing through them. Thus, the valley of the Rhone is styled the Upper and Lower Valais; that of the Adula, the Valtelline; of the Arve, Chamounix.

Communications Passes.—The valleys of the high Alps form the natural means of communication. Some are more accessible than others. The entrance into a longitudinal valley is almost always smooth and easy; art has often had to force an entrance into a transverse valley. On many of the high-roads which link the principal with the secondary valleys, it has been found necessary to blow up long ridges of rock, to build terraces, to make stone bridges and long galleries of rock as a protection against avalanches, as well as to erect places of shelter (*hospices*) from storms. The construction of these roads may be reckoned among the boldest and most skilful works of man. In crossing the Alps, several defiles (usually seven) have to be traversed; for in addition to the pass of the main crest, there are other defiles on both sides, at the entrances of the different valleys. In the east, the number of these narrow passes or defiles is considerably increased. The names applied to the Alpine passes vary according to their natural features or the local dialect; as Pass, Sattel (Saddle), Joch (Yoke), Scheideck, Klaus, Col, Chiusa. The traveller, in the course of a day's journey, experiences a succession of climatic changes, which is accompanied with an equal variety in the manners of the people.

No lofty mountains in the world are more easily crossed than the Alps; of late years, the Mont Cenis, the Brenner, and the St Gothard railways into Italy from the north afford special facilities. Hence we can understand how the plains of Upper Italy, accessible from the French, German, and Austrian sides, have for ages been the theatre of bloody strife. The passage of the WEST ALPS is made by five principal roads: (1) The military road, La Corniche, a coast-road at the foot of the Alps from Nice to Genoa, parallel to which a railway now runs. (2) The causeway over the Col di Tenda, between Nice and Genoa, made in 1778; highest point, 6158 feet. (3) The high-road over Mont Genève, connecting Provence and Dauphiné with Turin; highest point, 6102 feet. (4) The carriage-road made by Napoleon in 1805, over Mont Cenis, connecting Savoy with Piedmont; highest point, 6848 feet. Near this the chain is pierced by the railway tunnel opened in 1871 (see TUNNEL, and CENIS). (5) The pass of the Little St Bernard, connecting Geneva, Savoy, and Piedmont; highest point, 7190 feet. Besides these great roads, there are many smaller ones branching off from them, which form a pretty close network of communication. It has been debated whether Hannibal crossed the Cottian Alps by the Cenis, or the Graian by the Little St Bernard. The passage of the MIDDLE ALPS is made by eight principal roads. (1) That of the Great St Bernard, connecting the valley of the Rhone with Piedmont; highest point, 8120 feet. It was crossed by Napoleon in 1800. (2) The magnificent road over the Simplon, constructed by Napoleon, 1801-6,

and connecting the Valais with the confines of Piedmont and Lombardy; highest point, 6595 feet. The project of effecting another junction of the Swiss and Italian railways by a tunnel through the Simplon, at a cost of 60,000,000 francs, has been long in contemplation. (3) Between the Great St Bernard and Monte Rosa is the Matterjöh, connecting Piedmont with the Valais. (4) The pass of St Gothard, connecting Lucerne with Lago Maggiore; highest point, 6936 feet. The St Gothard (q.v.) Railway tunnel was opened for traffic in 1882. (5) The Bernardino Pass, made 1819-23, by the Swiss Grisons and Sardinia; highest point, 6769 feet. (6) The Splügen Pass, repaired in 1822, connecting the sources of the Rhine with the Adda. This pass was the one used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine, and also by the German armies on their marches into Italy in the middle ages. (7) The Wornser Joeh, also called the Ortler Pass, or Road, opened by Austria in 1824. It connects the Tyrol with Lombardy. (8) The Brenner Pass, known to the Romans. It also connects the Tyrol with Lombardy; highest point, 4588 feet. It is now crossed by a railway. Besides these great roads, leading south into Italy, there are two which lead north from the valley of the Rhone, and cross the Bernese Alps, over the Grimsel Pass, 6500 feet high, and the Gemmi Pass, 7553 feet high. The roads over the EAST ALPS are much lower, and also much more numerous than those in the MIDDLE or WEST ALPS. The principal are: (1) The road from Venice to Salzburg, crossing the Noric Alps at an elevation of rather more than 5100 feet. (2) The road over the Carnian Alps, which divides into three branches

the first leading to Lienz; the second, to the valley of the Isongo; and the third to the valley of the Fagghamento. (3) The roads from the Danube at Linz to Lienz.

Geology. The rocks which enter into the composition of the Alps belong to many different geological systems, and occur for the most part as more or less interrupted belts or zones, which extend in the same general direction as the great chain itself, viz. from SW. to NE. The higher and central ranges consist principally of crystalline schists, such as gneiss and mica-schist, with which granite is occasionally associated. These crystalline Archaean rocks are flanked on either side by an irregular zone of various sedimentary strata, such as clay-slate, grey-wacke, &c., along with beds of limestone, dolomite, &c., the fossils in which show that this zone contains representatives of the Silurian, Devonian, Carboniferous, and Permian systems. The Triassic strata, occurring in irregular belts on both sides of the great chain, are developed chiefly in the East Alps, where they comprise massive limestones and dolomites of marine origin, remarkable for their fossils, which show a curious commingling of Palaeozoic and Mesozoic forms. Liassic strata are poorly developed in the Alps, but they are noted at Schambelen (Aargau, Switzerland) for their abundant and beautifully preserved insect-remains. The Jurassic system is represented on both sides of the Alps, but is developed chiefly in the low grounds of Switzerland, whence it extends into the Jura Mountains. The Cretaceous system appears in like manner on both sides of the Alps, the most prominent feature of the system being its massive Chippuritic lime-

Oligocene and Miocene are best developed in Switzerland, where they form some of the better-known mountains at the foot of the Alps, such as the Righi, the Rossberg, &c. They consist chiefly of conglomerates, sandstones, and similar strata. Patches of sands referable to the Pliocene occur here and there at the base of the Alps in North Italy. The Pleistocene is well represented by a great variety of superficial accumulations, of which the most noteworthy are the ancient moraines, erratics, and perched blocks, fluvio-glacial detritus, and other memorials of the glacial period.

The geological structure of the Alps clearly shows that these mountains are 'mountains of upheaval.' The strata of which they are composed must originally have been spread out in approximately horizontal positions, and they have since been folded, flexed, puckered, and fractured. In the Jura we see the strata folded into symmetrical 'anticlines' and 'synclines' the strata form, in short, a succession of regular parallel arches and troughs. As we approach the Alps, however, the folds become more and more irregular, until at last in these mountains the strata are flexed and convoluted in the most perplexing manner—the strata being often completely overturned or reversed, so that the younger seem to be covered by the older formations. Evidently the rocks have been subjected to enormous compression and crushing. According to Professor Heim, the Alps have lost 72 miles of their breadth from compression; in other words, were the convoluted and wrinkled strata of the Alps to be smoothed or flattened out, their breadth, which is now about 130 miles, would reach not less than 200 miles. Since the great folds of the chain extend from SW. to NE., it is obvious that the Alps have been upheaved by tangential thrusts, acting from NW., or from SE., or from both directions. The mountains were not upheaved all at once. On the contrary, there is evidence to show that their upheaval took place at several epochs; they are the result of various earth-movements, separated from each other by wide intervals of time. The latest, most extensive elevation of the Alps took place after the Eocene period, the 'nummulitic limestones' of that system occurring folded and much altered at heights of 10,000 feet. It was probably in Oligocene times, therefore, that the most powerful convolution of the strata was effected. Another great movement of elevation took place after Pliocene times, but it does not seem to have been accompanied with much contortion and disturbance of strata.

Since their upheaval, the Alps have suffered excessive denudation. Enormous mountain masses have been gradually removed by the action of ice, running water, &c. It is therefore often extremely difficult to trace any connection between the present configuration and that which must have obtained when the strata were first squeezed into great undulations. In fact, these mountains are not more an evidence and memorial of the stupendous effects produced by earth-movements, than they are of the potency of long continued denudation. One of the most interesting questions connected with the physical geology of the Alps is that of the origin of the remarkable rock-basins which are occupied by the beautiful lakes of Switzerland and North Italy. By some geologists these rock-basins are believed to be due to unequal movements of elevation or depressions, while others

now and again some granite, are abundantly developed, chiefly in the higher and central ranges of the Alps. In the Graian, Pennine, and Rhaetian Alps occur great masses of serpentine; in the north of Piedmont, and in the upper valley of the Adige, quartz-porphry, diorite, &c. Crystalline limestone is often associated with the clay-slate and greywacke, which flank on either side the crystalline schists of the central ranges. Limestone also predominates in the mountains that extend on the south side from Lake Maggiore to Agram. The Julian Alps are, in fact, chiefly composed of this rock. In like manner, limestones are well developed in the corresponding region on the west and north sides of the Alps.

Precious stones are found in abundance amongst the crystalline rocks of the central ranges, especially in the region of the St Gothard. The rock-crystal of St Gothard has a world-wide reputation. Mining and smelting become more and more productive as we advance eastward. Switzerland itself is poor in useful ores. Gold and silver are found in Tyrol, Salzburg, and Carinthia; there are also silver-mines in Styria and Illyria, and one near Grenoble, in France. Copper is found in the French Alps, in Tyrol, and Styria. There are well-known lead-mines near Villach, in Carinthia. The yield of iron in Switzerland, Savoy, and Salzburg is trifling; Carinthia and Styria, on the other hand, produce large amounts; and a considerable quantity of quicksilver is extracted at Idria, in Carniola. The Alpine region is rich in salt, especially at Hall in Tyrol, and Hallein in Salzburg. Coal is found in Switzerland, in Savoy, and in the French Alps, but in no great quantity; the Austrian Alps are, again, richer in this important mineral. The mineral springs, hot and cold, that occur in the region of the Alps are innumerable. See AIX, ISCHL, LEUK, BADEN, &c.

Animals. The Alpine mountains present many peculiarities worthy of notice in the animal as well as in the vegetable kingdom (see ALPINE PLANTS). On the same heights, the number of insects is very great; the butterflies are especially numerous. The great lakes of the Alps have a restricted, but broadly distributed fauna; they are often very rich in fishes, and salmon and trout are sometimes caught in ponds even 6000 feet above the level of the sea. The frog, newt, black salamander, and other amphibians occur at considerable elevations. Although the lofty mountains are inhabited by eagles, hawks, and various species of owls, yet the birds are few in comparison with the numbers in the plains, and those few are mostly confined to the larger valleys. Among the quadrupeds, the ibex or steinbok, a wild goat, is sometimes, though rarely, to be met with; the chamois is more frequently seen, chiefly in the eastern district. The marmot (*Arctomys marmotta*) inhabits the upper Alpine regions. The Alpine hare (*Lepus coriabilis*), which is white in winter, and the snow mouse or vole (*Arvicola nivalis*) may also be mentioned. Wolves are seen more frequently in the west than in the east; in the latter, on the other hand, bears, lynxes, and wild-cats are found, although constantly diminishing in number. The more characteristic Alpine forms are the survivors of a fauna much more widely distributed in the glacial periods. Of the domestic animals, goats and oxen are scattered everywhere in large herds. There are fewer sheep and horses, and these are not of good breeds. Mules and asses are used more frequently in the south than in the north, especially as beasts of burden. Swine and dogs are not common; the latter are used almost solely by the herdsmen, or are kept in the houses, to assist in searching for the unfortunate wanderers who may be lost in the snow.

Inhabitants.—The population of the Alpine regions is estimated at 6,000,000 to 7,000,000, of whom perhaps one half are Teutonic, and the other half of French, Italian, or Slavonic origin, in pretty equal proportions. Six states share the Alps. The western portion is shared by France and Italy. Switzerland claims the Middle Alps almost exclusively for her own. Bavaria has only a small share. Austria has the largest share of the Alps in the provinces of Tyrol, Illyria, Styria, and the archduchy. The wide valleys opening to the east allow the civilisation of the plains to enter easily among the mountains. The value of the minerals, and the fertility of the soil, have permitted mining, manufactures, and agriculture to take firm root, and a flourishing trade has caused large towns to usurp the place of mere Alpine villages. In the Tyrol, the pastoral life of the mountains has long been mixed up with the working of mines of salt or other minerals. The inhabitants of whole valleys are occupied in various branches of industry to a greater extent than in any other district of the Alps, and their sons travel far and near as artisans. The Alpine mountains are rich in singularly beautiful natural scenery, and attract such crowds of visitors that they have been called 'the playground of Europe' (see ALPINE CLUB). Among works on the Alps may be mentioned those by Agassiz, H. & A. Schlagintweit (Leip. 1850-4), Sir R. I. Murchison, and Tyndall (Lond. 1860).

Apurjaras (Arabic *Al-Basherat*), a name applied to all the valleys lying south of the chief chain of the Sierra Nevada, in the south of Spain. The ascent of Mula Haen (11,781 feet), the highest point of the Sierra Nevada, can be accomplished from the village of Trevelez, 5330 feet above sea-level. Some of the valleys are very fertile. Towards the south flourish, under an almost tropical climate, all the products of the south, even the date-palm and the sugar cane.

Alsace-Lorraine (Gex. *Elsass-Lothringen*), since 1871 a state or 'imperial territory' (*Reichsland*) of the German empire, bounded west by France, east by Baden, and south by Switzerland. Its utmost length, from north to south, is 123 miles; its breadth varies between 22 and 105 miles; and its area is 5580 sq. m., of which 1353 belong to Upper Alsace (in the south), 1814 to Lower Alsace (N.E.), and 2383 to Lorraine (N.W.). Pop. (1871) 1,549,738; (1885) 1,561,354, of whom 78 per cent. were Catholics, and 80 per cent. German-speaking; 1,368,711 were natives of Alsace-Lorraine, and 151,755 Germans from other parts of the empire. There is a large popular literature in the Alsatian (German) dialect, a branch of the Allemannian. The French-speaking population is mainly in the larger towns and in Lorraine. The Rhine flows 115 miles north-by-eastward along all the eastern boundary, and receives, below Strassburg, the Ill from Alsace, 127 miles long. Other rivers are the Moselle, flowing through Lorraine past Metz, and its affluent the Saar. Along the Rhine is a strip of level country, 9 to 17 miles broad, and declining from 800 to 450 feet above sea-level. Westward of this rise the Vosges Mountains, culminating at a height of 4677 feet; whilst Lorraine, rather hilly than mountainous, rarely attains 1300 feet. About 48·5 per cent. of the entire area is arable, 11·6 meadow and pasture, and 30·8 under wood. Alsace-Lorraine produces much wine, grain, and tobacco; it is rich in mines, iron and coal; and manufactures iron, cotton, wool, silks, chemicals, glass, and paper. It contains the important cities of Strassburg, Mühlhausen, Metz, and Colmar. As a French province, Alsace was divided into the departments

of Haut-Rhin and Bas-Rhin. Lorraine fell into the departments of Mense, Moselle, Meurthe, and Vosges (parts of all which still remain French). The lieutenant-governor (*statthalter*), representing the imperial government, resides at Strasburg, and is assisted by a ministry of five departments, and a council of state.

In Cesar's time Alsace-Lorraine was occupied by Celtic tribes, and formed part of ancient Gaul; but during the decline of the empire, the Alenanni and other tribes from beyond the Rhine occupied and largely Germanised it. From the 10th century it formed part of the German empire, under various sovereign dukes and princes, latterly of the House of Hapsburg; till a part of it was ceded to France at the peace of Westphalia (1648), and the rest fell a prey to the aggressions of Louis XIV., who seized Strasburg (1681) by surprise in time of peace. By the peace of Ryswick (1697), the cession of the whole was ratified. Thus—as the Germans used to complain—was this fine land, with one of the noblest branches of the race, alienated from the German people, and the command of the German Rhine disgracefully surrendered to the enemy in the time of misfortune. German never ceased to be the chief language of the people, and all newspapers were, during the whole period of the French possession, printed in both languages. In 1814-15 Russia would not hear of the restitution of Alsace-Lorraine to Germany; and it was not till 1871, after the Franco-German war, that Alsace and German Lorraine were, by the treaty of Frankfurt, incorporated in the new German empire. The great mass of the population were strongly against the change, and 160,000 elected to be French, though only 50,000 went into actual exile, refusing to become German subjects. For, at least since the era of the Revolution, Alsace in sentiment was wholly French. To France she gave the bravest of her sons—Kellermann, Kleber, and many another hero. Strasburg first heard the *Marseillaise*; and MM. Erckmann Chatrian, Alsations both, have faithfully represented their countrymen's love of *La Patrie* in the days of the second as of the first Napoleon. Nor have the Germans done much to endear themselves, with their savings at Germanisation, their anti-clericalism, and their compulsory service in the German army. Field-marshal von Manteuffel was lieutenant-governor of Alsace-Lorraine from 1879 till his death in 1885; but not even he succeeded, for the elections of 1881, 1884, and 1887 showed a much stronger anti-German feeling than that of 1877-78. And during 1880-85 no fewer than 49,254 natives left their homes, their place being only partially occupied by 36,955 immigrants from Germany. France, too, is always thinking of her loss, eager some day to repair it; and the imperial territory, discontented and under stringent rule, remains a perpetual cause of strained relations between France and Germany. Alsace-Lorraine, for ages the borderland and battlefield of two great powers, has not yet fulfilled its destiny. For the history of Lorraine, see **LORRAINE**.

Alsatia, a cant name applied to the precinct of Whitefriars, which, until 1697, enjoyed the privilege of a debtors' sanctuary, and hence was crowded with swindlers and bullies. The name is first met with in 1623, and we have Shadw comedy, *The Squire of Alsatia* (1688). See authority for some of the finest scenes in the *Fortunes of Nigel*.

Alsen, an island in the Baltic, off the coast of Sleswick. Formerly Danish, it became Prussian in 1864. Its greatest length is 59 miles; its greatest breadth 12; and its area is 121 sq. m. Pop. 25,000, almost all Danish-speaking. The island, one of

the finest in the Baltic, has a picturesque appearance, is very fertile, with rich woods, and numerous lakes abounding in fish. The chief town is Sonderborg, with an excellent harbour, and a population of 6000.

Alster, a river in Holstein, is formed by the confluence of three streams, and, in the neighbourhood of Hamburg, spreads itself out, and forms a lake, called the Great or Outer Alster, and within the town, the Inner Alster. It flows by several canals into the Elbe.

Alstrœmeria, or *Alstrœmer's Lily*, a genus of Amaryllidaceæ (q.v.), cultivated for its flowers and curiously twisted leaves, which have the upper in the normal position of the lower surface. Some have climbing or twining stems; amongst these is the beautiful *salsilla* (*A. salsilla*), a native of Peru, which is cultivated in the West Indies, and its tubers eaten like those of the potato. In Britain, it requires the stove or a hot-bed. *A. ovata*, also a beautiful plant, with a slender twining stem and ovate leaves, is cultivated in Chili for its tubers, which weigh 3 to 6 ounces, and are used as food. A kind of arrowroot is also prepared in Chili from the succulent roots of *A. pallida* and other species.

Altai, the Ghin-shan or Golden Mountains of the Chinese, is the name given to a wild mountainous region which covers the southern parts of Tomsk, in Siberia, and partly extends into Mongolia. It comprises the mountainous border-region of the great plateau of Central Asia, between the Tian-shan and the Sajan Mountains, and consists of two separate parts: the Altai proper, belonging to the Russian empire; and the Great Altai, in Mongolia. The former covers with its numerous intricate chains and their spurs a surface three as large as Switzerland. Although occupied by the Russians since the 17th century, its orography and structure are but imperfectly known. A huge mountain-ridge, the Saïnghem, which separates Russia from China, is the border-ridge of the Central Asian plateau; it is continued to the SW, as the high but yet unexplored ridge of West Sajan, which fringes the plateau in the basin of the Yenisei. Its summits reach a height of from 7000 to 9000 feet. It is pierced in the SW, by the deep depression of Lake Zaisan, which gives an easy access to the high plateau of Central Asia. A series of no less than three different chains fringes the Saïnghem ridge towards the NW. Some of these chains are snow-clad, and their highest summit, Byelukta, reaches the height of 11,500 feet; while the others do not exceed 7500 feet. Granites, syenites, and partly also porphyries covered with crystalline slates, as also with Silurian, Devonian, and Carboniferous deposits, constitute the mountains. Deep and wild gorges, immense glaciers, beautiful alpine lakes (the Teletsk, 1600 feet above the sea), and fertile alpine valleys (like the Bukhtarna Valley, 190 miles long), render the Altai a most attractive alpine region. The valleys on its out-kirts are being rapidly colonised by Russian agriculturists (600,000 in 1882), who find an easy living in the fertile soil, and the rich sub-alpine meadows. The gold washings of the Altai, and its silver, lead, copper, iron, and coal mines, are another source of wealth. Nearly 45,000 Kalmucks, Tentes, and Kumandintses represent the small remainder of the formerly much denser and more highly civilised population, all of the Ural-Altaic stock. The town of Barnaul (17,180 inhabitants) is the chief centre of administration. See **ASIA**.

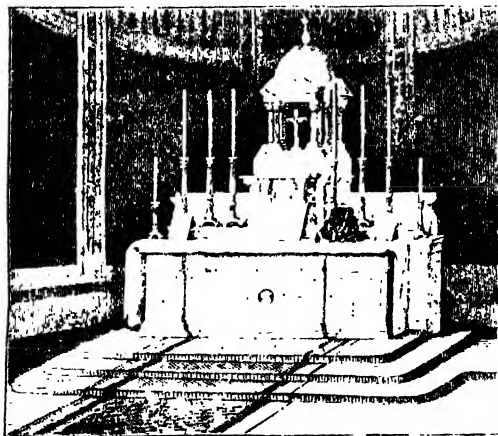
As to the Great Altai—still very little known—it is represented on our maps as a high chain of mountains running from NW. to SE., from Lake Zaisan to the central parts of the Gobi, and bordering

in the north the Urumtsi depression. It has been partly explored of late by M. Potanin.

Altamura, a town of South Italy, 28 miles SW. of Bari, at the eastern base of the Apennines. It has a fine cathedral, founded by the Emperor Frederick II. in 1220. Pop. (1881) 19,817.

Altar (Lat. *altare*, from *altus*, 'high'), the place whereon offerings were laid both by Jews and heathens. The first on record is that which Noah built on leaving the ark. The Israelites, after the giving of the Law, were commanded to make one. Both in the Jewish tabernacle and temple there were two altars, one for sacrifices, and another for incense. The Jewish and oriental altars were generally either square or oblong; those of Greece and Rome, on the other hand, were often round. Sacrifices were offered to the infernal gods, not on altars, but in cavities dug in the ground (see SACRIFICE).

The word has been transferred into the Christian system. For upwards of five centuries, altars in the Christian churches were for the most part made of wood, and an altar of this kind is still to be seen in St John Lateran's at Rome. But the custom of celebrating the liturgical service on the marble sepulchre of the martyrs in the catacombs, led to the introduction of stone altars; and in a council held at Epone in France, 509 A.D., it was decreed that none should be consecrated with chrism except those built of stone. In the Roman Catholic Church, the rubrics require that all altars should be of stone, but the stone itself may be only large enough to hold the host and chalice, and the slab, perhaps no more than a foot square, may rest on, or be inserted in, a board of wood. Such a stone may with license be used as a 'portable altar' by priests requiring to say mass on a journey or in private houses. The stone must in all cases be provided with relics inclosed within it, and be consecrated by a bishop. The altar must be covered with three cloths, one of which must reach to the ground. It could also, if possible, have attached to it in front a 'pallium,' or frontal, varying in



High Altar:

Church of the Sacred Heart, Edinburgh.

colour according to the feast or season. The essentials of the altar for mass in Roman Catholic churches are the altar itself, the altar cloths, the missal, the three cards (containing portions of the missal), the tabernacle for the reservation of the host, and the crucifix. In the throne above the tabernacle, the host is occasionally exposed in a vessel called the Monstrance (q.v.), as at the service of the 'Benediction;' the crucifix being

removed. The crucifix must stand upon or above the altar, between two candles. The missal is moved from side to side of the altar at various parts of the mass. The epistle is read from the right side, and the gospel from the left; hence it is customary to speak of the epistle and gospel sides of the altar. The Credence Table (q.v.) and the Piscina (q.v.) are adjuncts of an altar.

In the first ages of Christianity, there was only one altar in a church; but, from a very early time, the Latins have used more than one. The principal altar is called the high altar. In the 12th century, the adorning of churches with numerous altars was carried to a great extent, and they were embellished with gold, silver, and precious stones. The Greek Church use but one altar. Altars were frequently placed at the west end of the ancient churches (as in the old British Church), instead of the east. The only perfect altar of the old times in England is the high altar of Arundel church, Sussex. The slab is 12 feet 6 inches long, by 4 feet wide, and 2½ inches thick; the support is of solid stone, quite plain. For 300 years after the time of Christ, the word altar was constantly used to describe the table of the Lord; subsequently 'table' and 'altar' were used indifferently. In the first Prayer-book of King Edward (1549), the word altar was used in the rubric, and the Lord's Supper was still called the Mass; but in 1550, an order was issued for the setting up of tables instead of altars, and in the second Prayer book of 1552, the word 'altar' was everywhere superseded by 'table;' though 'altar' is retained throughout the coronation service. The table was further ordered to be of wood, and movable. In Mary's reign the altars were re-erected; but in Queen Elizabeth's, some were riotously pulled down, and injunctions were then issued directing that this should not be done, except under the oversight of the curate and at least one churchwarden. It was charged against Archbishop Laud that he had converted communion-tables into altars. What he really did was to remove the tables out of the body of the church, and place them 'altarwise' i.e. north and south, at the upper end of the chancels, where the altars formerly stood; and a dog having on one occasion run away with a piece of the consecrated bread, he directed that rails should be erected to prevent such desecration in future. By the judgment in the Arches Court, 1843, in the case of *Faulkner v. Litchfield*, it was decided that altars may not be erected in churches. This case arose out of the erection, by the Cambridge Camden Society, of a stone altar in the Church of the Holy Sepulchre in that town; but it may be questioned whether this judgment has not been virtually modified by the subsequent action of the English Church, and the incorrect effect of the judgments of the same court and of the privy council in the case of *Sheppard v. Bennet* in 1870.

Bowing towards the altar is an ancient practice of the church, a mark of homage offered to the seat of the presence of Christ in Holy Communion. Among Roman Catholics, it is the custom to genuflect before the altar when the host is reserved in the Tabernacle (q.v.).

The doctrine of Sacrifice is fully discussed under that head. See LIGHTS (USE OF), BALDACHIN, HIGH PLACES.

Altazimuth (a contraction for *altitude and azimuth instrument*), an astronomical instrument for determining the apparent places of the heavenly bodies on the celestial sphere. It consists of a telescope revolving about a horizontal axis, which in turn revolves about another vertical axis, the angle of revolution being measured in each case by a divided circle. These angles give the Altitude (q.v.) and Azimuth (q.v.) of the heavenly body

observed at the instant of observation, and so indicate its place. Small instruments of this kind are used in surveys. The principal one in existence is that at Greenwich, designed by Sir George Airy, the object of which was to supplement the lunar observations taken on the meridian by the Transit Instrument (q.v.) by others taken when the moon was in other parts of the sky. Its two chief principles of structure are, that as many parts as possible are cast in one piece, and that no power of adjustment is provided anywhere; the errors of construction and original adjustment being allowed for in the reduction of the observations. By means of this instrument much has been gained in knowledge of the moon's places, the observations made with it, owing to its freedom of pointing to any part of the heavens, exceeding in number those obtained by the fixed meridional instruments in the proportion of 16 to 9. The altazimuth is not, however, in general use, owing to its liability to many errors, unless, as at Greenwich, most carefully and solidly designed and constructed.

Altdorfer, ALBRECHT, painter, engraver, and architect, was born at Ratisbon about 1480, and died there in February 1538. It is not certain whether he was a pupil of Dürer; at any rate, he belongs to that religious school of artists of which Dürer was the head. His pictures are animated by a glowing and romantic poetic spirit; and the landscape is delineated with the same truth and tenderness as the figures. His masterpiece, now in Munich, is 'Alexander's Victory over Darius.' As an engraver, Altdorfer is reckoned among the 'Little Masters.' See W. B. Scott's *Little Masters* (1879).

Altea, a Spanish seaport, 25 miles N.E. of Alicante. The harbour is good. Pop. 5869.

Alten, KARL AUGUST, COUNT OF, Hanoverian general, entered the army in 1781, but in 1803 left Hanover for England, where he was made commander in the German Legion. In almost all the engagements of the Spanish war of liberation he took a prominent part; and he fought with distinction at Quatre-Bras and Waterloo. After his return to Hanover, he was made minister of war. He died April 20, 1840.

Altena, a town of Prussia, in the district of Arnsberg, 47 miles N.W. of Siegen by rail, in a deep and picturesque valley. It manufactures needles, pins, and hardware. Pop. 8787.

Altenburg, the capital of the duchy of Saxe-Altenburg, is situated on the Pleisse, in a fertile country, 30 miles S. of Leipzig by rail. Standing on an almost perpendicular rock of porphyry, the old castle of Altenburg forms a striking feature in the landscape. Its foundations are probably as old as the 11th century; and, since the two fires of 1865 and 1868, it has been finely restored. It is memorable as the place whence, in 1455, a neighbouring knight, Kunz von Kaufungen, carried off the young Saxon princes, Ernest and Albert. Before he could reach the Bohemian frontier, he was apprehended by a charcoal burner and handed over to the executioner. The episode is known in history as the 'Prinzenraub. Brashed woollen goods, gloves, and cigars are among the manufactures. Pop. (1885) 24,110.

Altengaard, a hamlet in Fianmarken, the northernmost province of Norway, situated on the south side of the Alten Fiord, in 69° 55' N. lat. Beyond this point, no cultivation is attempted; and even here, potatoes and barley alone are produced. There is here a meteorological and magnetic station.

Altenstein, KARL, BARON VON STEIN ZUM, a Prussian statesman, born at Ansbach, October 7, 1770. In 1808 he became the head of the depart-

ment of finance, and in 1817 was made minister of public worship and education. He had much to do with founding the universities of Berlin and Bonn. He died at Berlin, May 14, 1840.

Alteratives, in Medicine, a term applied to remedies that 'improve the nutrition of the body without exerting any very perceptible action on individual organs' (Lander Brunton). This group includes a number of substances of the most diverse characters and properties, having this only in common, that their mode of action is obscure, though its results are often of the greatest value. In fact 'we use the word alteratives very much as a cloak for our ignorance.' It has been suggested, that alteratives act either by modifying the action of the ferments in the body, or by replacing the normal constituents of the tissues by others with different properties. Among the most important alteratives are various preparations of arsenic, mercury, iodine, phosphorus, gold; cod-liver oil, colchicum, gualiacum, sarsaparilla. Many of them are violent poisons when taken in improper doses. As examples of their action, may be cited the beneficial effect of mercury and iodides in the various morbid processes of syphilis; of cod-liver oil and iodides in strumous diseases; of arsenic in inflammations of the skin.

Alternate, in Botany. See LEAVES.

Alternation of Generations. See GENERATION: (ALTERNATION OF).

Althæa. See MARSH MALLOWS and HOLLY-HOCK.

Althorn. See SAMHORN.

Altitude, in Astronomy, is the height of a heavenly body above the horizon. It is measured, not by linear distance, but by the angle which a line drawn from the eye to the heavenly body makes with the plane of the horizon, or by the arc of a vertical circle intercepted between the body and the horizon. Altitudes are taken in observatories by means of a telescope attached to a graduated circle (see CIRCLE), which is fixed vertically. The telescope being directed towards the body to be observed, the angle which it makes with the horizon is read off the graduated circle. The altitude thus observed must receive various corrections, the chief being for Parallax (q.v.) and Refraction (q.v.) in order to get the true altitude. At sea, the altitude is taken by means of a Sextant (q.v.), and then it has further to be corrected for the dip of the visible horizon below the true horizon (see HORIZON). The correct determination of altitudes is of great importance in most of the problems of astronomy and navigation (see LATITUDE and LONGITUDE). AN ALTITUDE AND AZIMUTH INSTRUMENT, called by contraction ALT-AZIMUTH (q.v.), consists essentially of a vertical circle with its telescope so arranged as to be capable of being turned round horizontally to any point of the compass. See AZIMUTH.

Alto, in Music, is properly the same as Counter Tenor (q.v.), the male voice of the highest pitch (now principally falsetto), and *not* the lowest female voice, which is properly contralto, though in printed music the second part in a quartet is always entitled *alto*. See CONTRALTO.

Alton, a town of Hampshire, 8½ miles S.W. of Farnham. Its Perpendicular parish church was thoroughly restored in 1867. Hops are grown in the neighbourhood, and there are large breweries in the town. Pop. (1851) 2828; (1881) 4497.

Alton, a city and port of entry of Illinois, U.S., on the left bank of the Mississippi River, 24 miles N. of St. Louis, and 8 miles above the mouth of the Missouri. Laid out in 1817, and since 1868 the seat of a Catholic bishopric, it is a centre of

commerce, and has a Baptist college (1836), several mills and manufactories, and an abundant supply of limestone. Pop. (1860) 6332; (1880) 8975.

Altona, the largest and richest city in the Prussian province of Sleswick-Holstein, is situated on the steep right bank of the Elbe, just below Hamburg, so that the two cities are divided only by the state-boundaries. Altona lies higher than Hamburg, and is much healthier; but, in a commercial point of view, the two may be almost regarded as forming a single city. The trade is largely with America. There are many important industrial establishments in Altona, such as cotton and woollen mills, tobacco and soap factories. The celebrated observatory, founded by Schumacher in 1823, was transferred to Kiel in 1874. Of public buildings, the most notable are the churches of the Trinity (1743) and St John (1873); and of four monuments, there is one to the governor, Von Blücher (1832). Invested with special privileges in 1664, and burnt by the Swedes in 1713, Altona has declined in importance since its annexation to Prussia (1866). Its population, however, has increased rapidly—(1840) 28,095; (1860) 45,524; (1885) 104,719.

Altoona, a city of Pennsylvania, U.S., at the eastern base of the Alleghenies, 117 miles E. of Pittsburg. It contains large locomotive works and machine-shops in connection with the Pennsylvania Central Railroad, employing 4500 hands. Near Altoona is a remarkable triumph of railway engineering, known as the 'Horseshoe Bend.' Pop. (1870) 10,610; (1880) 19,716.

Altorf, or **ALTDORF**, the chief town in the Swiss canton Uri, is situated in a sheltered spot at the base of the Grunberg, at the head of the Lake of Lucerne. The little tower on which the legendary exploits of William Tell are painted in rude frescoes is of dubious antiquity. Situated on the St Gothard road and railway, Altorf has some transit trade. Pop. about 3000. The old town of **ALDORF**, or **ALTDORF**, in Middle Franconia (pop. 4000), was the seat of a university from 1623 to 1809.

Alto-relievo (Ital., 'high relief'), in Sculpture, used of figures projecting from the background on which they are carved, by at least half their thickness; so called as distinguished from *basso-relievo* ('low relief'), and *mezzo-relievo* (see **RELIEF**, **SCULPTURE**). The Elgin Marbles (q.v.) comprise the most notable high reliefs.

Altötting, a very ancient place of pilgrimage in Upper Bavaria, not far from the river Inn. The chapel, said to have been built on the site of a heathen temple, contains the famous black image of the Virgin Mary, dating from the 8th century, and an extraordinarily rich treasure of gold, silver, and precious stones. Another chapel contains the tomb of Tilly. Pop. (1885) 3232.

Altrincham, a market-town of Cheshire, England, on Bowden Downs, 8 miles SW. of Manchester by rail, is situated on the Bridgewater Canal. Its mayor is appointed annually, under an old charter, by the lord of the manor; but he has no jurisdiction, his chief duties being to open fairs and administer some funds left to the town three centuries ago. It is a very neat and clean town, and on account of the salubrity of the air, is much resorted to by invalids from Manchester. It has manufactures of artificial manures, and an iron-foundry; but a chief employment of its inhabitants is the raising of fruits and vegetables for the market of Manchester. Pop. (1851) 4488; (1871) 8473; (1881) 11,249.

Altruism is the English form of the Fr. *altruisme*, a word formed by Comte from the Lat. *altruus*, 'of or to others;' and, introduced

into English by the translators and followers of Comte, has gradually come into more general use. It is opposed to egoism or selfishness, and means unselfishness or devotion to the welfare of others as a principle of action or an element of character. See **ETHICS**, **UTILITARIANISM**, &c.

Alum, a white, saline substance, with a sweetish, astringent taste, is, properly speaking, a double salt, being composed of sulphate of potash and sulphate of alumina, which, uniting together along with a certain proportion of water, crystallise in octahedrons or in cubes. Its formula is $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$. Alum is soluble in eighteen times its weight of cold water, and in its own weight of hot water. The solution thus obtained is strongly acid to coloured test-papers. When heated, the crystals melt in their water of crystallisation; and when the water is completely driven off by heat, there is left a spongy white mass, called burnt alum or anhydrous alum. Alum is much used as a mordant in dyeing. This property it owes to the alumina in it, which has a strong attraction for textile tissues, and also for colouring matters; the alumina thus becomes the means of fixing the colour in the cloth. The manufacture of the colours or paints called lakes depends on this property of alumina to attach to itself certain colouring matters. Thus, if a solution of alum is coloured with cochineal or madder, and ammonia or carbonate of soda is added, the alumina of the alum is precipitated with the colour attached to it, and the liquid is left colourless. Alumina, the basis of pure clay—which is a silicate of alumina—derives its name from being first extracted from alum. Alum is also used in the preparation of leather from skins, and, in medicine, as a powerful astringent for arresting bleeding and mucous discharges. Its use to impart whiteness to bread made from poor flour is highly objectionable.

Alum rarely occurs in nature, except in a few springs and in some extinct volcanoes, where it appears to be formed from the action of sulphurous acid vapours upon feldspathic rocks. In this country it is prepared artificially from alum-shale, obtained from coal-mines at Harlet and Campsie, near Glasgow; and from alum-slate, which occurs at Whitby, in Yorkshire. The alum slate, shale, or schist consists mainly of clay (silicate of alumina), iron pyrites (disulphuret of iron), and coaly or bituminous matter. When the shale is exposed to the air

as it is in the old *coal-works* or mines from which the coal has been extracted—the oxygen of the air, assisted by moisture, effects a decided change upon it. The original hard stony substance begins to split up into thin leaves, and becomes studded over and interspersed with crystals. The latter are the result of the oxidation of the sulphur of the pyrites into sulphuric acid, and the iron into oxide of iron, both of which in part combine to form sulphate of iron, whilst the excess of the sulphuric acid unites with the alumina of the clay, and produces sulphate of alumina. When the alum shale thus weathered is digested in water, there dissolve out the sulphate of alumina, $Al_2(SO_4)_3$, and sulphate of iron, $FeSO_4$; this solution is treated with chloride of potassium, KCl , which decomposes the sulphate of iron, forming sulphate of potash, K_2SO_4 , and protochloride of iron, $FeCl_2$. When this liquid is evaporated to concentration, and allowed to cool, crystals of alum, leaving the composition above described, separate out, and the protochloride of iron is left in the solution or *mother-liquor*. The crystals of alum obtained from the first crystallisation are not free from iron, and hence require to be redissolved in water, re-concentrated, and recrystallised. This operation is generally repeated a third time before the alum is obtained pure. As the preliminary weathering of the shale takes some years

to complete, a more expeditious method is now largely resorted to. The shale is broken in fragments, and piled up over brushwood in long ridges shaped like huge potato-pits, and the brushwood being set fire to, the coaly matter of the shale begins to burn, and the whole ridge undergoes the process of roasting; the results of which are the same as that of the weathering operation—namely, the oxidation of the sulphur and iron, and the formation of sulphate of alumina and sulphate of iron. This material is afterwards worked up as previously described. The roasting operation is so much more expeditious than the weathering process, that months suffice instead of years. The alum made at Tofla, near Civita Vecchia, is extracted from aluminous stone, a mineral containing sulphate of potash and sulphate of alumina, but united in such a form as to render them insoluble. When the mineral is calcined, the sulphates become soluble, and are extracted by lixiviation. The alum thus manufactured crystallises in opaque cubes, having a reddish tint, due to the presence of iron, and goes by the name of *Roman alum*. The potash in alum can be replaced partly or altogether by soda or ammonia; the alumina by oxide of chromium or sesquioxide of manganese; or the sulphuric acid by chromic acid, or peroxide of iron, without altering the form of the crystals. There are thus soda, ammonia, chrome, iron, &c. alums, forming a genus of salts of which common alum (potash alum) is only one of the species. The more important members of the class, expressed in symbols, are:

$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, potash alum.

$Na_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, soda alum.

$(NH_4)_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, ammonia alum.

$K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$, chrome potash alum.

$FeSO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, iron alum.

Alum-Bagh (*Alumbagh*), a fort rendered famous during the Indian mutiny in 1857. It was a domain about 4 miles from the city of Lucknow, and comprised a palace, a mosque, and a park; and was converted by the rebels into a fort. It was taken by the British forces in September, and on evacuating Lucknow, Sir Colin Campbell left Sir James Outram with 3500 men to hold the Alum Bagh. He was surrounded by the insurgent forces of 30,000 sepoys and 50,000 volunteers, and was repeatedly attacked by them, but in vain. In March, Sir Colin Campbell reconquered Lucknow, and relieved the Alum-Bagh from its perilous isolation. Havelock had been buried within the walls in November 1857.

Alumina, the most abundant of the Earths (q.v.), is the oxide of the metal Aluminium (q.v.), the formula being Al_2O_3 . It occurs in nature abundantly in combination with silica, associated with other bases. The most familiar of its native compounds is feldspar, a silicate of alumina and potash, $K_2O \cdot Al_2O_3 \cdot 6SiO_2$. This is one of the constituents of granite, and of several other igneous rocks. Certain varieties of these, by exposure to the atmosphere, become completely disintegrated, passing from the state of hard, solid rock, such as we are accustomed to see in building-granite, into soft, crumbling, earthy masses. It is the feldspar which undergoes the change; and it appears to be owing to the action of rain-water charged with carbonic acid, which dissolves the potash and some of the silica of the feldspar, leaving the excess of silica and the alumina still united. It is not known, however, why certain specimens of granite are rapidly corroded and crumbled down, whilst others have resisted for ages the same causes of decay. By such a process of disintegration as we have described, the clays of our arable soils are produced. Clay consists of silica and alumina in a state of

chemical combination. It never is pure alumina, but the quantity of silica united to the latter is variable. When it is pure, clay is quite white, as we see in the porcelain clay of Devonshire and Cornwall, which is derived from colourless felspar. More frequently, clay is red, owing to the presence of oxide of iron; or black, from the diffusion through it of vegetable matter.

From alum, alumina is prepared by adding to a solution of the former, water of ammonia, as long as it occasions a precipitate. The alumina appears as a voluminous, white, gelatinous substance, consisting of the oxide of the metal combined with water. When alumina is precipitated from a solution containing colouring matter, such as log-wood, &c., it carries down the colour chemically united to the flocculent precipitate; in this way are formed the coloured earths called *Lakes* (q.v.). Alumina in the state of precipitate, after being gently dried, is readily soluble in acids and in alkalis; but if strongly heated, at a certain temperature it presents an appearance of sudden incandescence, it loses the associated water, contracts greatly in bulk, and now forms a white, soft powder, not at all gritty, and with difficulty soluble in alkalis and acids. Alumina, as generally prepared, whether hydrated or anhydrous, is insoluble in water, possesses no taste, and does not alter colouring matters; but it has also been obtained in an allotropic hydrated form, which, in the presence of a very small proportion of acetic acid, is largely soluble in water, from which a minute trace of sulphuric acid precipitates it. It is quite different, therefore, in properties from the alkaline earths, and is a much weaker base. In the anhydrous state it absorbs water with great readiness without combining with it, so that it adheres to the tongue, and is felt to parch it. Clay retains this property; and the ends of tobacco-pipes are often glazed, to prevent adhesion to the lips or tongue. Alumina is not fusible by a forge or furnace heat, but it melts before the oxyhydrogen blow-pipe into a clear globule, possessing great hardness. It occurs in nature in a similar state. The more coarsely crystallised specimens form the emery which is used for polishing; the transparent crystals, when of a blue colour, owing to a trace of metallic oxide, constitute the precious gem the sapphire, and, when red, the ruby. Alumina, in common with other sesquioxides, is a feeble base. The salts it forms with the acids have almost all a sour taste, and an acid action on colouring matter.

Aluminium,—syn. *Al*, eq. 27.4—is one of the metals present in clay, felspar, slate, and many more rocks and minerals. It was discovered by Wöhler in 1828, and was re-examined by him in 1846, when he obtained the metal in minute globules or beads, by heating a mixture of chloride of aluminium and sodium. In 1855, the French chemist Deville showed, as the result of a series of experiments, that aluminium could be prepared on a large scale and in a compact form without much difficulty. The mineral cryolite found in Greenland, which is a double fluoride of aluminium and sodium, was the ore first used for its manufacture; but bauxite, a mineral found in France, and consisting chiefly of alumina or oxide of aluminium, and oxide of iron, has more recently been employed as a convenient source of the metal. An aluminite of soda is first obtained by heating the bauxite with soda ash in a furnace, and separating it (the aluminite) from the insoluble portions by lixiviation. When carbonic acid is passed through the solution, pure alumina is thrown down. The alumina is then formed into balls with common salt and charcoal, which are heated in an earthenware retort through which chlorine gas is passed. In this part of the process,

the charcoal combines with the oxygen, and the chlorine with the aluminium; the latter sublimes over with the common salt (chloride of sodium), and is collected as a double chloride of aluminium and sodium. When this double chloride is heated in a reverberatory furnace with fluxes and metallic sodium, the latter seizes the chlorine combined with the aluminium, which is then set free, and falls to the bottom ready to be cast into ingots for use. The manufacture of aluminium was started in 1860 near Newcastle, by Mr (afterwards Sir) L. L. Bell; but owing to the restricted demand for the metal, the works were stopped, and it has been since chiefly manufactured in France. Recently, however, works have been again started in England by the Aluminium Crown Metal Company, at Hollywood, near Birmingham. Here the metal is made from alum. Large works have also been started at Detroit by the American Aluminium Company. A new process for the production of sodium, invented by H. Y. Castner of New York, was made public in 1887. The sodium is obtained from caustic soda by heating this substance along with carbon and iron in steel crucibles. It is asserted by some eminent chemists that by this process the price of sodium will be greatly reduced. If so, the cost of aluminium will also be much lessened, as sodium is largely used in its manufacture.

The properties of aluminium are, that it is a white metal, somewhat resembling silver, but possessing a bluish hue, which reminds one of zinc. This bluish colour can be whitened by hydrofluoric and phosphoric acids, and also by a heated solution of potash. It is very malleable and ductile, in tenacity it approaches iron, and it takes a high polish. It fuses at about 1202° F. (700 C.), and can then be cast in moulds into ingots. Exposed to dry or moist air, it is unalterable, and does not oxidise or tarnish like most common metals. Neither cold nor hot water has any action upon it. Sulphuretted hydrogen, the gas which so readily tarnishes the silver in households, does not act on aluminium, which is found to preserve its appearance under all ordinary circumstances as perfectly as gold does. When cast into moulds, it is a soft metal like pure silver, and has a density of 2.56; but when hammered or rolled, it becomes as hard as iron, and its density increases to 2.67. It is therefore a very light metal, being lighter than glass, and only one-fourth as heavy as silver. Aluminium is very sonorous, a bar of it when struck giving out a very sweet clear ringing sound. It is a good conductor of heat and electricity. Considerable difficulty was long experienced in working the metal, for want of a suitable solder. That generally used consists of aluminium, 6 per cent.; copper, 4 per cent.; and zinc, 90 per cent.

Aluminium is still rather more than one-half of the price of silver, and has not the beautiful colour of the latter. These reasons seem to prevail against its extensive use in the arts. On the other hand, it is hard to understand how a metal with such remarkable properties is not in greater demand. During the last thirty years, such articles as coins, medals, statuettes, personal ornaments, keys, helmets, sabre sheaths, mounts for furniture, culinary vessels, and many other things, for which its strength and lightness render it particularly suitable, have all been tried, and have failed to take the market. It is now chiefly used for optical, surgical, and chemical instruments or pieces of apparatus. Aluminium leaf and wire may be employed with great advantage in place of silver for decoration, or silver wire for embroidery.

Aluminium Linzer.—Aluminium forms, with

copper, several light, very hard, white alloys; also a yellow alloy, which, though much lighter than gold, is very similar to it in colour. This gold-like alloy, which is ordinary aluminium bronze, contains from 5 to 10 per cent. of aluminium, and is very strong, was discovered by Dr Percy of London. For many years it has been manufactured into watch chains, pencil-cases, and other small ornamental articles. More lately it has been made on a limited scale into such articles as table-plate and carriage mountings, which have an attractive appearance. This bronze, which can be made with a tensile strength equal to steel, has certain advantages for field-guns. Its anti-friction and wearing qualities make it well adapted for bearings of shafts; but its price, namely 1s. 6d. per lb., being considerably in excess of ordinary bronze, somewhat hinders its use on a large scale for objects of utility.

An alloy of aluminium and tin is used for optical instruments, and from another of aluminium and silver called 'Tiers Argent,' excellent spoons and forks are made. See J. W. Richards, *Aluminium; its History* (1887).

Alum Root. This name is given in the United States to two plants, natives of that country, very different from one another, but agreeing in the remarkable astringency of their roots, which are medicinally used. One of these plants is *Geranium maculatum* (see GERANIUM). The root contains more tannin than Kino (q.v.) does. The property of astringency belongs, in an inferior degree, to some other species of Geranium, and of the kindred genera, Erodium and Pelargonium. The other American plant to which the name alum root is given is *Hebeche americana*, a plant of the natural order Saxifragaceæ (q.v.), an order in which also astringency is a prevalent property. The root is a powerful styptic, and is used to form a wash for wounds and obstinate ulcers.

Alunno, Niccolo or Niccolo of Fuligno, one of the earliest of the old Umbrian painters, was born at Fuligno about 1430. His early works were all frescoes, and his subjects were mainly religious. Alunno is not so remarkable for the fertility of his invention as for his warmth of feeling, purity, and devout faith; and may be accounted a worthy predecessor of Perugino.

Alured, or ALFRED, of Beverley, in Yorkshire, an old English historian of the time of Henry I. Little is known regarding him, save that he was treasurer and sacrist of the church of Beverley, where he wrote his *Annals*, in nine books. This work commences with the fabulous period of British history, and extends down to the year 1129. It is a mere rechauffé of Geoffrey of Monmouth, Bede, and Henry of Huntingdon. Written apparently about 1143, it was published at Oxford in 1716 by Thomas Hearne. Alured died in 1128 or 1129.

Alva, a village in a detached portion of Stirlingshire, at the base of the Ochils, 7½ miles E.N.E. of Stirling by rail (1863). It is a place of great industrial activity, having extensive woollen factories, in which the manufacture of shawls and tweeds has superseded that of blankets. To the east of the village is the Silver Glen, where two pits still mark the site of old silver mines, opened about 1712. Immediately behind the village is Alva Glen, noted for its picturesque beauty and magnificent waterfall. Pop. (1841) 2392; (1881) 4961.

Alva, or ALBA, FERDINAND ALVAREZ DE TOLEDO, DUKE OF, prime minister and general of the Spanish armies under Charles V. and Philip II., was born in 1508, of one of the most illustrious families of Spain. He entered the army a mere youth, and gave such proofs of his courage and

capacity for command in the battle of Pavia (1525), in Hungary in battles against the Turks, in Charles V.'s expedition to Tunis and Algiers, and in Provence, that he rose quickly from rank to rank, becoming general at twenty-six, and commander-in-chief at thirty years of age. His skilful defence of Navarre and Catalonia gained him his rank as Duke of Alva. In 1547 he contributed greatly to the victory which Charles V. gained at Mühlberg over John Frederick, Elector of Saxony. Under his influence, as president of the council of war, the captive elector was condemned to death; and it was entirely against his wish that the emperor commuted the sentence. He took part under the emperor in the unsuccessful expedition against Henry II., king of France, who had taken possession of Metz; but was more fortunate in his next campaign (in 1555) in Italy, against the combined armies of the pope and the French king. After the abdication of Charles V. in 1556, Alva continued to hold the command of the army, and overran the States of the Church, but was obliged by the command of Philip II. to conclude a peace with Pope Paul IV., and restore all his conquests. Being recalled from Italy, he appeared in 1559 at the court of France, and as proxy for his sovereign espoused Elizabeth, Henry II.'s daughter.

When the inhabitant of the Netherlands, who had been accustomed to freedom, revolted against the tyranny of Spain, and especially against the hated Inquisition, the Duke of Alva's counsel was to suppress the insurrection with vigour. The king accordingly sent him to the Netherlands in 1567, with unlimited power and a large military force. His first step on arriving was to establish what was called the 'Bloody Council,' in which he himself at first presided, and over which he afterwards appointed the sanguinary Don Juan de Vargas. This tribunal condemned all without distinction whose opinions appeared dubious, or whose wealth excited jealousy. The present and the absent, the living and the dead, were subjected alike to trial, and their property confiscated by the council. As many as 100,000 abandoned their native country, many of them industrious artists, mechanics, and merchants, who emigrated to England, while many others enlisted under the banners of the persecuted princes, Louis and William of Orange. Alva, rendered still more savage by a defeat which befell his lieutenant, the Duke of Arenberg, sent Counts Egmont and Horn to the block. He afterwards defeated Prince Louis, and compelled William of Orange to retire to Germany; upon which he entered Brussels in the greatest triumph on the 22d December 1568. The pope presented him with a consecrated hat and sword, as Defender of the Catholic faith: an honour which, having been hitherto conferred only on crowned heads, increased his insolence to the highest degree. His executioners shed more blood than his soldiers; and none now withstood his arms except Holland and Zealand. But these provinces continually renewed their efforts against him and succeeded in destroying the fleet which had been equipped by his orders. Recalled by his own desire in 1573, he resigned the command of the troops to the mild Don Louis de Requesens, and left the country, in which, as he himself boasted, he had executed 18,000 men. The war which he had kindled burned for nearly seventy years, and cost Spain untold treasure, her finest troops, and the loss of seven of the richest provinces of the Netherlands.

Alva soon lost the royal favour for sheltering his son from the consequences of a misdemeanour, and retired to his castle, till, in 1580, he was recalled to a command in the war against Portugal, the crown of which Philip claimed as his hereditary

right. He quickly drove out Don Antonio, who, as grandson of John III., had taken possession of the throne, and overran the whole country with his accustomed cruelty and rapacity; he seized the treasures of the capital himself, while he allowed the soldiers to plunder without mercy the suburbs and the surrounding country. Philip, dissatisfied with these proceedings, desired to have an investigation of the conduct of the duke; but the haughty bearing of the latter, and the fear of a revolt, induced him to abandon it. Shortly after, Alva died at Thomar, 12th January 1582, at the age of 74. He had a haughty carriage, a hard voice, and a dark and gloomy countenance. He was cruel, avaricious, and a fanatical bigot. It has been said of him, that during sixty years of military service he never lost a battle, and never allowed himself to be surprised. See Motley's *Dutch Republic* (1856).

Alvarado, a town of Mexico, on the Gulf of Mexico, at the mouth of the river Alvarado, 40 miles SE. of Vera Cruz. Pop. 6000.

Alvarado, PEDRO DE, a famous comrade of Cortes, was born at Badajoz, towards the close of the 15th century. In 1518 he sailed for the New World, and accompanied Grijalva in his exploring voyage along the shores of the American continent. It was now that the Spaniards heard for the first time of the riches of Montezuma, and of his vast empire. Alvarado was soon sent back to Cuba to inform the governor Velasquez of the result of the expedition. In February 1519 he sailed with Cortes and his little band of heroes from Havana, and took an active part in all the incidents of the conquest of Mexico. He held the city of Mexico during the absence of his chief, and massacred in the midst of a fête a great number of disaffected Aztec nobles. In the famous night-retreat of 1st July 1520 (*la noche trista*), Alvarado commanded the rear-guard, and covered himself with glory by his reckless courage. After the conquest of Mexico he subdued, with a small force, the tribes on the coast of the Pacific in the direction of Guatemala. On his return to Spain, the Emperor Charles V. gave him a splendid reception, and appointed him governor of Guatemala. Numerous adventurers followed him to the New World, and Alvarado soon embarked on the Pacific a force of five hundred soldiers for the capture of Quito. He landed near Cape San Francisco, whence he penetrated into the heart of the country, crossing the Andes by a daring march. In the interior he was met by some of the troops of Pizarro, headed by Almagro; but, chivalrously disclaiming any intention to interfere with his countryman's rights, he agreed to retire, on receiving an indemnity for his arduous undertaking. On his next visit to Spain, he cleared himself from the misrepresentations of Pizarro with such success that he received the government of Honduras in addition to Guatemala. Again he embarked for the New World, and pursued his course of discovery and conquest; but, having landed on the Mexican coast to aid the Spaniards in punishing a revolt of the Chichimecs of New Galicia, met his death through accident in 1541.

Alvarez, DON JOSE, the greatest of modern Spanish sculptors, was born in 1768, in the province of Cordova. During youth he laboured with his father, a stone-mason; and when twenty years old, began to study drawing and sculpture in the academy at Granada. He secured the patronage of the Bishop of Cordova, and in 1794 was received into the academy of San Fernando, where in 1799 he gained the first prize and a grant to enable him to study at Paris and Rome. In Rome, where he lived on terms of friendship with Canova and Thorvaldsen, he executed a famous group, now in the Royal Museum of Madrid,

representing a scene in the defence of Saragossa. He lived in Rome till 1826, and died at Madrid in 1827.

Alwar, or ULWAR, a Rajput state of India, in Rajputana. Its area is 3024 sq. m. The capital, Alwar, is a small town 94 miles WNW. of Agra. Pop. (1881) 682,926.

Alzey, a town of Rhenish Hesse, on the Selz, 18 miles SW. of Mainz. Pop. 5932.

Amadeus (i.e. 'Love-God'), a common name in the House of Savoy. The first who bore it was Count Amadeus, who lived in the 11th century; but the first to make an important figure in history was AMADEUS V. (1249-1323). AMADEUS VIII., born in 1383, secured the elevation of Savoy into a duchy (1416), and in 1418 Piedmont chose him for its ruler; but in 1434 he retired to a hermitage on the shores of the Lake of Geneva. He was elected pope in 1439, when he assumed the name of Felix V.; but he resigned the papal chair in 1449, and died two years afterwards at Geneva. AMADEUS I. of Spain, born in 1845, the second son of King Victor-Emmanuel of Italy, was elected king of Spain in 1870, but, owing to the want of popular sympathy with his government, he abdicated the throne in February 1873, and, as Duke of Aosta, returned to Italy.

Amadis, a much-used name in the chivalric poetry of the middle ages. Of the numerous romances that may be grouped under it, that which narrates the adventures of Amadis of Gaul is at once the most ancient and the best. It is believed that the earliest forms of the story were a lost Castilian version, perhaps about 1250, and a Portuguese version, also lost, composed about 1370 by Vasco de Lobeira of Porto. Most likely these earlier versions were in verse. Instead of these, we have a Spanish version of almost a hundred years later, written by Garcí-Ordóñez de Montalvo about 1465, but first printed in 1508. This prose romance is one of the three spared by the licentiate and the barber at the burning of Don Quixote's books, and the barber's reason is that 'it is the best of all the books of this kind.' Its hero is Amadis, the model of every knightly virtue, son of King Perion of Gaul and Elisena, Princess of Brittany; he is sent away to Scotland, where he falls in love with Oriana, the incomparable daughter of King Lisuarte of England, and the narration of the course of this love story, with its varied adventures, wide journeys into foreign lands, numberless struggles with knights, giants, and robbers, forms the chief subject of the romance. The work is wearisome from its length, but it contains many pathetic and striking passages, and has great value as a mirror of the manners of the age of chivalry.

The Spanish Amadis romances consist of twelve books, of which the first four contain the history of Amadis of Gaul. The earliest existing version of this is, as has been said, that of Montalvo, and the earliest edition now in existence bears the date of 1508. He himself added a fifth book containing the adventures of Esplandian (1510), the eldest son of Amadis and Oriana; later writers have multiplied the posterity of the old hero. Already in 1510 appeared a sixth book, with the history of Florisando, his nephew; in 1514, 1526, and 1535 respectively, a seventh, eighth, and ninth book, with the wonderful histories of Lisuarte of Greece, a son of Esplandian, and Perion of Gaul, and the still more wonderful history of Amadis of Greece, a great-grandson of the Gallic hero. Then follow Don Florisel of Niquea and Amaxartes, son of Lisuarte, whose history, with that of the children of the latter, fills the tenth and eleventh books. Lastly, the twelfth book, printed in 1536, narrates the exploit of Don Silves de la Selva,

son of Amadis of Greece and Finistea. A French translation appeared in 1540, an Italian in 1546, an English in 1588, while a version in German was published in 1583. The French translators increased this series of romances from twelve to twenty-four books; the German, to thirty. Lastly, a Frenchman, Gilbert Saunier Duverdier, at the beginning of the 17th century, arranged all these romances into a harmonious and consecutive series, and with his compilation in seven volumes, the *Roman des Romans*, brought the history of Amadis and the series of about fifty volumes to a close. A version of the old romance in French was published by Crenzé de Lesser in 1813; in English, by William Stewart Rose, in 1803; while the literary skill of Southey produced in 1803 an abridgment that is still readable. On the other hand, Wieland's *Neuer Amadis* has nothing in common with the more ancient Amadis, except the title. See Baret, *De l'Amadis de Gaule* (Par. 1873); and Brannfels, *Amadis von Gallien* (Leip. 1876).

Am'adou (Fr.) is obtained from two species of Hymenomyce Fungi, *Polyporus igniarius* (hard amadou, or touchwood) and *P. foenicularius* (soft amadou, or German tinder). They grow upon old trees in Britain, and on the continent of Europe. They are used as styptics for stanching slight wounds; and when steel and flint were in general use for striking fire, were much employed as tinder, being prepared for this purpose by boiling in a solution of nitre. Attempts have also been made at their cultivation. The soft amadou is used for making small surgical pads, for which its elasticity peculiarly fits it. It is also employed by the Laplanders and others for Moxa (q.v.). It is sometimes made into razor-strops, and this use is likewise made of *P. betulinus*. *P. officinalis*, the *Apyricum* of Dioscorides, which grows upon larch-trees in the south of Europe, is a drastic purgative, now rarely employed. *P. saccharatus*, which grows upon the stems of willows, and is easily recognised by its misle-like smell, was formerly employed in medicine, in cases of consumption, under the name of *Fungus salicis*. All these species are very similar in appearance. Another species of the same genus, *P. destructor*, is one of the fungi known by the name of Dry Rot (q.v.).—The remarkably light wood of *Hexandria graminænsis*, a shrub of the natural order Thymelæaceæ, is readily kindled by flint and steel, and is used in Guiana as amadou.

Amalekites, a warlike, nomadic tribe in SW. of Palestine and the peninsula of Sinai. From the very first, they manifested an uncompromising hostility to the Israelites, whose rear guard they attacked after the passage through the Red Sea. In consequence of this, they received no mercy at the hands of the Israelites, when the latter had established themselves in Palestine. Saul nearly annihilated them. Twenty years later, David, while dwelling amongst the Philistines, penetrated into their land, and defeated them with dreadful slaughter. Another rising was mercilessly crushed by David, and the descendants of the survivors were finally extirpated in the days of Hezekiah, king of Judah, by the Simeonites.

Amalfi, a seaport on the Gulf of Salerno, on the W. coast of Southern Italy, is nearly encircled by mountains, and lies at the mouth of a deep ravine, 24 miles SE. of Naples. It is the seat of an ancient archbishopric, and, besides the ancient Romanesque cathedral, possesses several fine churches and a Capuchin convent. In 1881 the population had sunk to 4792, who are chiefly engaged in the coasting trade, fisheries, and the manufacture of paper, soap, and macaroni. The history of Amalfi in the middle ages is both

important and interesting. It is said to have been founded under Constantine the Great, and was long a powerful and independent republic, having at one time a population of 50,000, besides a dependent territory ten times as large; it was governed by its own 'doges,' and was the centre of eastern trade; but about the close of the 11th century, fell under the power of the Normans. It was plundered by the Pisans in 1135, and its commercial decay was completed by a terrible storm in 1343, which destroyed its quays. The maritime laws of Amalfi (*Tabula Amalphitana*) once prevailed throughout Italy, and formed an important contribution to the *Consolato del Mare* (see MERCANTILE LAW). The unique manuscript of the Pandects (q.v.) was discovered at Amalfi; and Flavio Gioja, the inventor of the compass, and Masaniello, were born there.

Amalgam is the term applied to that class of Alloys (q.v.) in which one of the combining metals is mercury. On the nature of the union, it has been observed that 'on adding successive small quantities of silver to mercury, a great variety of fluid amalgams are apparently produced; but in reality, the chief, if not the sole compound, is a solid amalgam, which is merely diffused throughout the fluid mass.' The fluidity of an amalgam would thus seem to depend on there being an excess of mercury above what is necessary to form a definite compound. Mercury unites readily with gold and silver at the usual temperature. It has no disposition to unite with iron even when hot. A solid amalgam of tin is used to silver looking-glasses.

Amalgamation is employed on a small scale in some processes of gilding, the silver or other metal being overlaid with a film of gold amalgam, and the mercury being then driven off by heat. But its most extensive use is in separating gold, and especially silver, from certain of their ores. The mercury dissolves the particles of the metal, and leaves the earthy particles; it is then easily separated from the gold or silver. This process, discovered in Mexico in 1557 by Bartolome de Medina, is still used in Mexico, and was introduced with great success into the Californian and Australian gold fields. The mode of application is to crush the quartz rock which serves as the matrix in which the small particles of gold are imbedded; place the fragments in a barrel or revolving drum with mercury, and agitate for some time. The mercury attaches all the gold particles to itself; and in the apparatus, when fully agitated, there is found a semi-fluid mass, which is the mercury, appearing half-encased, and containing all the gold. It is only necessary to place this amalgam in a retort and apply heat, when the mercury sublimes over, and can be re-employed for further amalgamation, and leaves the gold in the body of the retort.

Several amalgams may be regarded as definite chemical compounds. Thus, when gold leaf is placed in mercury, and the amalgam so produced filtered by being squeezed in a chamois-leather bag, the uncombined mercury oozes through the skin, but a definite amalgam of 2 of gold and 1 of mercury remains behind in the tender filter. Tin amalgam is employed in silvering looking-glasses; and is formed by laying a sheet of tin-foil on a table, covering it with mercury, and then placing, by a sliding movement, the sheet of glass over it. This amalgam contains 3 of mercury and 1 of tin; glass balls are silvered with an amalgam of 10 mercury, 1 tin, 1 lead, and 2 bismuth, best prepared by melting together the last three metals, and then adding the mercury.

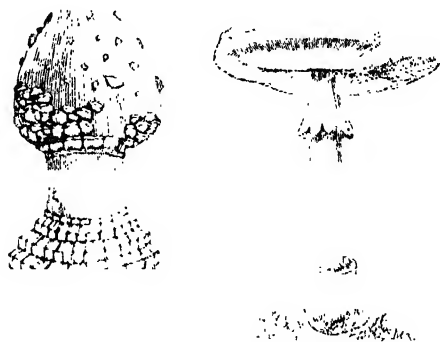
A silver amalgam, containing about 26 per cent. of metallic silver—and, from the clusters of crystals

somewhat resembling a tree, called *Arbor Diana*, or Tree of Diana—is prepared by placing about half a teaspoonful of mercury in a small phial, and filling the bottle with a solution of nitrate of silver of the strength of 25 grains to the ounce. In the course of a few days the arborescent appearance presents itself. The amalgam used for frictional electric machines is made from 1 tin, 1 zinc, and 3 mercury, to which sand is afterwards added.

Amalia, ANNA, Duchess of Saxe Weimar, was born in 1739, and, left a widow in the second year of her marriage (1758), by her judicious rule as guardian of her infant son, she enabled the country to recover from the effects of the Seven Years' War. She appointed Wieland tutor to her son, afterwards Grand-duke, and attracted to Weimar such men as Herder, Goethe, Muscœus, Schiller; forming a galaxy of genius such as few courts were ever graced with. The battle of Jena is said to have broken her heart; she died (1807) six months after that event.

Amande de Terre. See CYPERUS.

Amanita, a genus of Hymenomycete Fungi, nearly allied to the mushrooms (*Agaricus*). Several of the species are edible, notably the delicious Orange (*A. caesarea*), but the majority are poisonous. *A. muscaria*, which is pretty common in woods, especially of fir and beech, in Britain, is one of the most dangerous fungi. It is sometimes called Fly Agaric, being used in Sweden and other countries to kill flies and bugs, for which



Amanita muscaria,

Amanita muscaria,
full grown, in section

purpose it is steeped in milk. The pileus or cap is of an orange-red colour, with white warts, the gills white, and the stem bulbous. It grows to a considerable size. It contains a bitter and narcotic principle, resembling in its physiological action that of Indian hemp (*Chaschish*), and is used by the Kamechadales to produce intoxication. The intoxicating principle passes off in the urine of those who swallow it, a circumstance of which they or others often avail themselves, when abundance of the fungus is not at hand.

Amaranth (*Amaranthus*), the leading genus of Amaranthaceæ, an order differing from Chenopodiaceæ (q.v.), in the possession of a crowded bracteate inflorescence and membranous perianth. *A. caudatus* (Love-lies-bleeding), *A. speciosus*, *A. hypochondriacus* (Prince's Feather), and other species, are common annuals in our flower gardens. *A. tricolor*, from China, is cultivated in the Southern United States, and is popularly known as Joseph's Coat. The spikes of *A. caudatus* are sometimes several feet in length. The dry red bracts which surround the flower retain their freshness for a long time after being gathered; for which reason the plant has been employed from early times as

an emblem of immortality.—The Globe Amaranth (*Gomphrena globosa*) and the Cockcomb (q.v.), well-known tender annuals, belong to the same natural order. The Globe Amaranth is much cultivated in Portugal and other Roman Catholic countries for adorning churches in winter. Its flowers, which are of a shining purple, retain their beauty and freshness for several years. No species



Love-lies-bleeding
(*Amarantus caudatus*)

of the order can be regarded as a true native of Britain, although *A. blitum* is now found in waste places near London and elsewhere. *A. blitum*, *A. decussatus*, and other species, are used as pot herbs, but rarely in Britain. Wholesome mucilaginous qualities are very generally found in the leaves throughout the order. The seeds of *A. fruticulatus* (called Kiery) and of *A. acedabum* are gathered as crop crops in India.

Medicinal properties are ascribed to some species of the order, particularly to *Gomphrena officinalis* and *macrocephala*, which have a high and probably exaggerated reputation in Brazil, as the

popular names, '*para todo*' &c., indicate, as cures for many diseases.

Amarapura ('city of the gods'), till 1860 the capital of Burmah, was situated on the left bank of the Irrawadi, 6 miles N.E. of Ava. Founded in 1783, it was totally destroyed by fire in 1810, and almost totally by earthquake in 1839; so that the population dwindled from 175,000 in 1800, to almost nil after Mandalay became the seat of government. Little remains of the old city but some rows of beautiful trees and a few ruined pagodas.

Amara-Sinha, a celebrated Hindu grammarian, of whose life little is known; his date is by various authorities put at 56 B.C., the 5th century A.D., and the 11th century. He was a Buddhist; and it is believed that most of his writings perished during the persecution by the orthodox Brahmins in the 4th and 5th centuries. His *Amara-Kosha* ('Thesaurus of Amara') is a Sanskrit vocabulary, containing in all about 10,000 words, and has been largely used by almost all the grammarians of India.

Ama'ri, MICHELE, an Italian historian and orientalist, was born at Palermo, July 7, 1806. Hardly had he commenced his studies when his father's sentence to thirty years' imprisonment for a political offence plunged him into straitened circumstances. His love for an English lady saved him from despair, and secured him a knowledge of the English tongue. He devoted himself to Sicilian history, and in 1841 published his famous investigation into the history of the Sicilian Vespers, a masterpiece of historical criticism, which reversed the common notion that the massacre was the result of a deep conspiracy on the part of the nobles; showing that it was rather a national outbreak, occasioned by the tyranny of the foreign rulers, that really brought about the deliverance of Sicily. The book was quickly prohibited, and, as a consequence, widely read. Its publisher was imprisoned, but its author fled to France. The

revolution of 1848 recalled him to Sicily, where he was elected vice-president of the committee of war, and next sent by the provisional government on a diplomatic mission to France and England. The restoration in 1849 sent him once more into exile, from which he was recalled in 1859 to fill the chair of Arabic, first at Pisa, afterwards at Florence. In 1860 he took an active part in Garibaldi's expedition to Sicily. After the accession of Sicily to the kingdom of Italy, he was made a senator, and in 1862 held the portfolio of Public Instruction, after which he returned to his chair. He presided over the Congress of Orientalists at Florence in 1878. His most important works are his *Storia dei Musulmani di Sicilia* (1853-73); *Biblioteca Arabo-sicula* (1857); *Nuovi Ricordi Arabici sulla Storia di Genova* (1873); and *Le Epigrafi Arabe di Sicilia* (1875).

Amaryllidææ, or AMARYLLIDACEÆ, a natural order of petaloid Monocotyledons, essentially distinguished from Liliacæ by their inferior ovary, and including many species distinguished by the beauty of their flowers. They are herbaceous plants, or when, as in the genera Agave and Fourcroya, they form woody stems, they have still the character of gigantic herbs rather than of shrubs. The greater part are bulbous rooted. There are about 400 known species, natives of tropical or subtropical, and more sparingly of temperate regions, but particularly abundant at the Cape of Good Hope. A few species only are European. Many of them are much-prized ornaments of our gardens and hothouses. Amongst these are different species of Narcissus, Amaryllis, Alstroemeria, Paneratum, &c. (q.v.). To this order belong the Snowdrop and Snowflake, and it includes also the American Aloe (*Aloe*). *Stenandrium lutea* is said to be the lily of the field referred to in the Sermon on the Mount. The properties of the Amaryllidææ are rarely very distinct; the Agave (q.v.), however, yields its juice, the bulbs of snowdrop and daffodil are emetic, and the juice of *Hemerocallis tuberosa* is used by the Hottentots as an arrow-poison.

Amaryllis, a genus of bulbous rooted herbs of the natural order Amaryllidææ (q.v.), contains a large number of species, natives of the warmer regions of the globe. Many of them have flowers of very great beauty, and are extensively cultivated by florists, who have also produced many varieties and hybrids.

Amasia, a town in the province of Sivas, in Asia Minor, in the deep valley of the Yesil Irnak. The ancient town, long capital of the kings of Pontus, was the birthplace of Strabo. There are numerous interesting remains of antiquity, particularly the tombs of the kings of Pontus. Much silk is produced in and around Amasia; also wine, cotton, corn, and madder. Silver, copper, and salt mines are wrought in the neighbourhood. Silk and salt are the chief articles of export. Pop. 25,000, of whom about one-third are Christians.

Amasis, a king of Egypt, of humble origin, who rose to be general, and when sent to put down an insurrection, joined the rebels, and was proclaimed king (570 B.C.). He cultivated the friendship of the Greeks, opened up to them the commerce of Egypt (previously confined to Naukratis), married a Greek wife, and took a body-guard of Greeks into pay. Pythagoras and Solon are said to have visited him. For his alliance with Polycrates, see POLYCRATES. During his reign of 44 years, he greatly promoted the prosperity and adornment of Egypt.

Amateur (Fr.), one who does anything for love, as distinguished from one who makes it a profession. There is no general definition of an

amateur applying to all sports, and different associations are by no means in accord. Thus, by the Amateur Athletic Association an amateur is defined as 'one who has never competed for a money-prize or staked bet, or with or against a professional or any prize, or who has never taught, pursued, or assisted in the practice of athletic exercises as a means of obtaining a livelihood.' By the rules, again, of the Amateur Rowing Association, 'no person shall be considered an amateur oarsman, sculler, or coxswain, (1) who has ever taken part in any open competition for a stake, money, or entrance-fee; (2) who has ever knowingly competed with or against a professional for any prize; (3) who has ever taught, pursued, or assisted in the practice of athletic exercises of any kind for profit; (4) who has ever been employed in or about boats, or in manual labour for money or wages; (5) who is or has been by trade or employment for wages a mechanic, artisan, or labourer, or engaged in any menial duty.' The bicycling rules differ, and certain competitions are allowed between amateurs and professionals; while many so-called amateurs are men in the pay of manufacturers of bicycles, and ride in races for the purpose of advertising their employers' machines. In cricket it has been said that the difference between amateur and professional is, that the amateur receives two or three times as much money as the professional. In lawn tennis and archery contests, money prizes are openly played for, and nobody thinks of calling the players professionals. In golf, the line between amateur and professional has always been difficult to draw, on account of the number of boys employed to carry clubs, who afterwards develop into tradesmen. The latest deliberation on the subject defines an amateur as one who does not play for, or accept, money prizes in a competition open to professionals.

Amati, a family of Cremona, famous violin-makers in the 16th and 17th centuries. Its most illustrious members were Andrea (died about 1577); his younger brother Nicola (flourished 1568-86); Andrea's two sons, Antonio (flourished 1580-1627) and Gerolamo; and the latter's son, Niccolò (1596-1650), the master of Guarneri and Stradivari. See VIOLIN.

Amatitlan, a deep lake in the Central American State of Guatemala, surrounded with high and precipitous rocks of volcanic origin. It empties into the Pacific Ocean through the river Michatoxet. Near the banks of the lake are many hot springs, and on the river is the town of Amatitlan, as late as 1810 but a miserable Indian village, but now, through the introduction of the cochineal, an active town of 10,000 inhabitants.

Amaurosis (Gr. *amauros*, 'obscure') is the name applied to total blindness when no change can be seen in the eye sufficient to account for it. *Amblyopia* is used to denote partial loss of sight under similar circumstances. The meaning of these terms has become very much more limited since the invention of the Ophthalmoscope (q.v.), which has rendered visible, in the interior of the eye, the cause of loss of sight in many cases where it was previously unknown. They are still, however, unfortunately sometimes used to denote loss of sight from atrophy of the optic nerve. See EYE (DISEASES OF).

Amaurosis and amblyopia may occur in the course of various diseases, especially diseases of the brain, Bright's disease, diabetes, hysteria; may result from a blow on the eye; or may be present, usually only in one eye, from early life (congenital amblyopia). Amblyopia, much more rarely amaurosis, may be produced by large doses of quinine, or by the prolonged and excessive use of alcohol,

opium, and other drugs, but far most commonly of tobacco (toxic amblyopia). The treatment of these conditions is the removal of their cause, when ascertainable. In toxic amblyopia, abstinence from the drug which produced the disease almost always results in cure, unless the case be of long standing and great severity.

Amazon, or **AMAZONS** (Portuguese *Amazons*), a river of South America, and the largest stream on the face of the globe. It is known locally by other names, such as Marañon, Orellana, Solimões, Parana-tinga, and Parana-nassu. According to geographical usage, the name Marañon belongs properly to the more northern of its two main head-streams, rising in Lake Llanicocha (Peru) about 10° 30' S. lat., 76° 10' W. long. Most geographers consider this stream (frequently called the Tunguragua) as the true Amazon; but some late writers insist that the river Apurimac, or Ucayali (the more southern of the two great head-streams), is the true Amazon. The Ucayali is some 320 miles longer than the Tunguragua. It is commonly said that the river Amazon, to its remotest source, is nearly 4000 miles long; but Mr H. H. Smith asserts that at the very longest the measurement will not much exceed 3000 miles. The Upper Marañon is the only stream that breaks through the central Cordillera of Peru; but five other streams, all tributaries of the Ucayali, cut through the magnificent eastern chain of the Andes, as also does the Marañon itself. Most of the upper branches flow in deep mountain gorges, which, though much elevated, have a hot climate. East of the Cordillera the vast forest-plain is entered, which stretches from the sub-Andean foothills to the sea. It is a region rich in botanical treasures, having a fertile soil and a prodigiously large rainfall. Owing to this rainfall, the country is traversed by a very great number of large navigable rivers, either direct or indirect affluents of the Amazon and many of them scarcely known even by name to the geographer. Steam navigation has been introduced on many of the larger branches; but the natural resources of the country are very little developed.

The principal tributaries from the north are the Napo, the Putumayo, the Japurá, and the Rio Negro; from the south the Javary, the Jutahy, the Jurua, the Purus (with its great affluent the Aguiré), the Madeira (itself the recipient of mighty rivers, such as the Beni and the Mamoré), the Tapajós, the Xingú, and the Tocantins, which receives the waters of the Araguay. For a considerable distance the main river forms the boundary between Peru and Ecuador; but its course lies chiefly through the northern half of Brazil, its general direction being to the NNE. Its mouth is crossed by the equator. The drainage area of the river is placed at 2,500,000 sq. m., or two-thirds the area of Europe; and the main stream and its tributaries are said to afford over 25,000 miles of water-way suitable for steam navigation. Many of the narrow side-channels, so characteristic of the Amazonian forest-plains, are navigable also, either by steamboat or by smaller craft, such as the canoe, in which the India rubber and other products of the forest are collected; and it is stated that the total length of navigable waters in the system is probably not less than 50,000 miles. There is some dispute as to whether the islands at the mouth of the river are really deltaic; but it is certain that further inland a great part of the country is insular and river-built, and consequently of a true delta formation. In the rainy season, much of this region is subject to overflow. The main channel, at the mouth, is 50 miles wide, exclusive of the Pará mouth and the island of Joazeiro. The

average flow of the river is placed at 2½ miles per hour. The tides are noticed for about 400 miles up the river. The tidal phenomenon called the *bore* (here known as *Pororoca*) is very destructive in the main channel of the lower river, near its mouth; and from this phenomenon the Indian name of the river (Amassona, 'boat destroyer') is said to be derived. There is, however, some reason to think that the name was really derived, as stated by the older writers, from the female warriors seen by early explorers in the valley of this river. The name Marañon is derived from a voyager who visited the river in 1503; Orellana was the name of one who sailed on it in 1540.

The outflowing current of the Amazon in times of flood is sometimes perceived at a distance of 200 miles from the land. The climate of the river-valley, though hot and very damp, is greatly mitigated by its trade-winds, which blow from the east with little interruption throughout the dry season. These winds at some periods of the year become very stormy and even dangerous to unskilled boat men. The river abounds in fish in very great variety of species, some of them of great value as food-fishes; and turtles and alligators are plentiful, as well as porpoises and manatees. The main river is fullest from March to June inclusive, and lowest in August and September. The surrounding country is very thinly peopled, and many of the native tribes are savages of wild and degraded character. The river is open to the commerce of all nations, but trade has been impeded by import and export duties. Mention should be made of the river Cassiquiare, a stream ordinarily navigable, which flows from the Orinoco 180 miles to the Rio Negro, the largest northern tributary of the Amazon. Pará is the principal outlet by sea of the commerce of the Amazon Valley. This valley has been the field of many unsuccessful attempts at colonisation. The immense extent of its forests (almost everywhere nearly impenetrable by land on account of the enormous growth of lianas, or woody vines of countless species) has greatly hindered the progress of agriculture. Many useful and some highly valuable timber-trees grow on the river. The botany of the country is not very well known, many of the trees having flowers only on the upper branches, the lower portions being cut off from the influence of the light by the dense foliage; hence the study of the flowers is not easy. It is one of the paradoxes of the region that this forest, the largest and densest in the world, imports from North America much of its building timber, and some of the steamers on the river have found it cheaper to consume English coal than to burn the wood which grows so abundantly on every side.

One of the leading pursuits of the lower valley is the shipment to Pará of india rubber and Brazil nuts, which are largely collected by the Indians and the scattered colonists. But even this employment is seldom remunerative. The rubber here found is of excellent quality and high price; but the times, places, and other conditions of gathering cargoes are extremely uncertain. The river and the forests afford to the natives all things which are required to satisfy their simple and artificial needs; consequently no systematic industry can flourish except on a relatively small scale. The western part of the Amazon Valley is, of course, more elevated than that of the great forest; and between its tributary streams there are occasionally round lofty mountain spurs, which are connected with the great range of the Eastern Andes. This region affords quinine-yielding barks, coca, cacao, sugar, coffee, palm wax, iperocaulis, copaliba, sarapapilla, vanilla, and other valuable vegetable products, and a considerable amount of

gold is procured in it. The scenery is finer and the productions are more varied than in the lower valley; but the climate is not any healthier, nor is the country in general any better settled.

See Agassiz, *A Journey in Brazil* (1868); H. W. Bates, *A Naturalist on the River Amazon*; W. H. Edwards, *Fifteen Thousand Miles on the Amazon*; H. H. Smith, *Brazil, the Amazons, and the Coast* (1880); Mrs Mulhall *Between the Amazon and the Andes* (1882).

Amazonas. (1) The northernmost province of Brazil, has an area of 753,439 sq. m., and an estimated population of (1885) 80,912. Its surface is covered with virgin forests. (2) A fertile department of Peru, bounded on the N. by Ecuador, with an area of 14,129 sq. m. Pop. 34,245.

Amazons, in Greek Mythology, a nation of women who suffered no men to remain among them, but marched to battle under the command of their queen. They held occasional intercourse with the men of the neighbouring states. If boys were born to them, they either sent them to their fathers or killed them. But they brought up the girls for war, and burned off their right breasts, that they might not be impeded in bending the bow. From this custom they received the name of Amazons, that is, 'breastless.' Such is the ordinary tale; and it is idle to look for any historical evidence to prove the actual existence of such a nation. Ebers and others insist that Greek imagination made the institution of armed priestesses, as found amongst various races, into nations of women warriors. Some writers, however, have supposed the word Amazon to have some connection with the Grecian word 'Maza,' signifying the moon, as if the myth of the Amazons had taken its origin in the worship of the moon, which prevailed on the borders of Asia. Three nations of Amazons have been mentioned by the ancients: (1) The Asiatic Amazons, from whom the others branched off. These dwelt on the shores of the Black Sea, and among the mountains of the Caucasus, especially in the neighbourhood of the modern Trebizond. They are said to have at one time subdued the whole of Asia, and to have built Smyrna, Ephesus, Cumæ, and other cities. Their queen, Hippolyte, or, according to others, Antiope, was killed by Heracles, in fulfilling the ninth of the labours imposed on him by Eurystheus, which consisted in taking from her the shoulder belt bestowed on her by Ares. On one of their expeditions, the Amazons came to Attica, in the time of Theseus. They also marched under the command of their queen, Penthesilea, to assist Priam against the Greeks. They even appear upon the scene in the time of Alexander the Great, when their queen, Thalestris, paid him a visit, in order to become a mother by the conqueror of Asia. (2) The Scythian Amazons, who in after-times married among the neighbouring Scythians, and withdrew farther into Sarmatia. — (3) The African Amazons, who, under the command of their queen, Myrina, subdued the Gorgons, marched through Egypt and Arabia, and founded their capital on the Lake Tritonis, but were then annihilated by Heracles. The myth of the Amazons was a fertile subject in ancient Greek art, and their historical existence and locality are gravely discussed by rationalising historians and geographers like Arrian and Strabo. Even later than the middle ages they were believed to exist in Africa and America, and the name of the river Amazon is a memorial of this belief. See Stricker, *Die Amazonen* (Berl. 1873). Real Amazons exist at the present day, in Dahomey, in Western Africa, where part of the army consists of women, who are regularly marshalled in regiments with distinctive uniform and badges. They are subjected to severe

discipline, and are said by travellers to be more than merely ornamental soldiers.

Ambala. See UMBALLA.

Ambassador. Diplomatic envoys are of four kinds: (1) Ambassadors accredited directly to a foreign sovereign, and personally representing the sovereign who appoints them. (2) Ministers accredited to a foreign sovereign or state, who do not represent the sovereign, but only the state which sends them, and its affairs. These are usually called envoys extraordinary and ministers plenipotentiary. (3) Ministers resident, called simply envoys. These differ not in representative power, but in dignity. (4) *Chargés d'Affaires* accredited to foreign ministers. The term ambassador is commonly used to denote any kind of diplomatic minister. Besides representing his sovereign, the ambassador keeps him well informed as to what goes on in the country where he resides; defends the interests of his fellow countrymen abroad; and promotes goodwill between his own country and that in which he dwells. He carries with him credentials, and instructions for his own guidance. The ambassador of the first rank is entitled to public and private audiences with the sovereign to whom he is sent; a minister of the second class, to private audiences only. In the performance of all his diplomatic duties, an ambassador is understood to represent, not only the affairs, but the dignity and the power of his master; and by the law of nations he has many important rights and privileges, the chief of which is exemption from the control of the municipal laws of the nation wherein he is to exercise his functions, an exemption that is not confined to the ambassador himself, but is extended to all his suite, including not only the persons employed by him in diplomatic services, but his wife, chaplain, and household generally. But there is a dispute among legal writers whether this exemption extends to *all crimes*, or whether it is limited to such offences as are *made prohibita*, as coining, and not to those that are *made in se*, as murder. But as the security of an ambassador in conducting the intercourse of nations is of more importance than the punishment of a particular crime, there are few modern examples of an ambassador being punished for any offence. The full exemption of an ambassador from legal process in civil cases was first recognised by 7 Anne, chap. 12, a statute passed to appease the wrath of Peter the Great of Russia on learning that his ambassador had been actually arrested, and taken out of his coach in London, for a debt of £50. It was, however, merely a declaratory act, confirming the common law and law of nations.

But although an ambassador is not amenable to any tribunal of the country he resides in, he cannot misconduct himself with impunity. He must respect the laws and customs of the country in which he is officially resident; and if he violates or offends these laws and customs, he may be complained of to the court or government which he represents; or if the offence is of a very serious nature, his recall may be demanded, on the sovereign to whom he has given such offence may dismiss him peremptorily, and further require that he be brought to trial in his own country. It hardly need be added, that if an ambassador is guilty of an offence which threatens the safety of the state, he ceases to enjoy the privileges of the exemption in question.

There are some other and inferior privileges which are very generally allowed to ambassadors: they are, for instance, permitted the free exercise of their religion; they are, in general, exempted from direct taxation, they have special letter-bags, and they are usually allowed to import their goods

without paying any custom-house duties—a privilege, however, which, being liable to abuse, has sometimes been limited. An ambassador proper takes rank after princes of the blood. The precedence of the minister plenipotentiary is, in England, after dukes. A sovereign can refuse to receive an ambassador; it is therefore usual to ascertain beforehand whether any particular appointment will be acceptable.

Ambassadors of the first class ordinarily reside regularly at the court to which they are accredited. But sometimes ambassadors are sent on special occasions, as for the negotiation of treaties, when they receive additional powers, and have the higher rank of Ambassadors Extraordinary. The employment of permanent ambassadors originated in the 15th century. Her Majesty's diplomatic corps includes only six ambassadors, in the more restricted sense of the word, who are accredited to the courts of Vienna, Paris, St. Petersburg, Constantinople, Berlin, and Rome, respectively. The salary given to a British ambassador at Paris is £8000 a year. The United States send to Europe only envoys extraordinary and ministers plenipotentiary; their representatives therefore rank in the second class of diplomatic agents, though there is theoretically no distinction made between the representatives of monarchies and republics. The usual title for ambassadors proper is 'excellency,' which is often conferred also on the lower ranks of ministers. See ENVOY, CHARGE D'AFFAIRES, CONSUL, and WAR (DECLARATION OF).

Amber, a decayed city in the Rajput state of Jaipur, India, formerly its capital, about 4 miles N.E. of Jaipur. It is situated on the margin of a small lake, in a deep hollow among hills. Few of its houses are inhabited; and its temples, formerly full of ascetics and devotees, are empty. On the slope of an adjacent hill is the vast and gorgeous palace of Amber, now silent and deserted.

Amber (through Spanish from Arabic *anbar*, 'ambergris,' from its supposed resemblance), a substance analogous to the vegetable resins, and in all probability derived from various extinct coniferous trees, although now appearing, like coal, as a product of the mineral kingdom. It is usually of a pale-yellow colour, sometimes reddish or brownish, is sometimes transparent, sometimes almost opaque, and is occasionally greenish, bluish, or violet coloured. It occurs in round irregular lumps, grains, or drops; has a perfectly conchoidal fracture, is slightly brittle, emits an agreeable odour when rubbed, melts at about 536° F. (280° C.), and burns with a bright flame and pleasant smell. It becomes negatively electric by friction, and possesses this property in a high degree—which, indeed, was first observed in it, and the term electricity is derived from *Elektron*, the Greek name of amber. The specific gravity of amber is 1.065 to 1.070. Deprived, by means of ether, of all its soluble constituents, its composition is similar to that of camphor, $C_{10}H_{16}O$. An acid called succinic acid (named from the Lat. *succinum*, 'amber') is obtained from it. It was highly prized by the ancients for personal and household ornaments. There is mention of it in Homer; and in lake dwellings and ancient graves in various parts of Europe amber ornaments have been found. It was regarded as a charm against disease and witchcraft. Great quantities are still consumed in Mohammedan worship at Mecca, and it is in great demand throughout the East. It was obtained by the ancients from the coasts of the Baltic Sea, where it is still found, especially between Königsberg and Memel, in greater abundance than anywhere else in the world. It is there partly cast up by the sea, especially after storms,

partly obtained by means of nets, and partly by systematic dredging; and is also obtained by digging in the 'blue earth' and other superficial strata near the coast, in which it is most plentifully found. The annual production in Prussia is about 220,000 lb., of which about one-third is cast up by the sea, and one-third obtained by dredging. Amber is for the most part state property in Prussia. It is found elsewhere also in coal, in shale, and chalk, and occasionally in diluvial deposits, as in the gravel near London; but it is very rare in Britain. It is obtained in small quantities from the coasts of Sicily and the Adriatic, and is found in different parts of Europe, in Siberia, Greenland, Kamchatka, Australia, United States, and elsewhere. It sometimes incloses crustacea, gentipodes, and insects of species which no longer exist. Leaves have also been found inclosed in it. Specimens which contain insects or leaves being much valued, fictitious ones are often manufactured and imposed upon collectors. According to an ancient fable, amber is the tears of the sisters of Phæthon, who, after his death, were changed into poplars. In the royal cabinet at Berlin is a piece weighing fifteen pounds, said to be the largest ever found, and valued at £1500; but it is extremely rare that pieces of ten pounds' weight are met with.

Amber had formerly a high reputation as a medicine, but the virtues ascribed to it were almost entirely imaginary. A volatile oil is obtained from it by distillation, which has the reputation of being an antispasmodic of special value in infantile convulsions. Amber is employed in the arts; for the manufacture of smokers' mouthpieces, for jewelry, and many ornamental objects. It is wrought by carving, rasping, filing, and polishing, or is turned on a lathe. Artificial amber is frequently used instead of the genuine article, which it closely resembles. It is composed of copal, camphor, and turpentine, and may be distinguished from amber by its lower melting-point, and by its readily softening in cold ether, which leaves real amber unaffected. It has been supposed that the famous Cremona violins owe their fine tone and preservation, in part at least, to the use of an amber varnish; and in the present day the production of such a varnish has occupied much attention. Amber contains two resins which in their natural condition are not soluble in spirit or turpentine. When fused, however, it is possible to incorporate boiled linseed oil and subsequently turpentine, but in this process great difficulty is experienced in avoiding overheating, resulting as it does in a dark-coloured and less limpid product. A very clear pale varnish is best obtained by heating six parts of amber, two of boiled linseed oil, and eighteen of turpentine to a temperature of 752° F. (400° C.), in a strong copper vessel capable of resisting the great pressure developed (about twenty atmospheres). The resulting product far surpasses the usual article in all important qualities.

Amberg, a town of Bavaria, once the capital of the Upper Palatinate, 35 miles E. of Nuremberg. Chief buildings are the town-hall (1490) and the church of St Martin (1421), with a steeple 321 feet high. There is a large arsenal; and the principal products are fireworks, earthenware, woollen cloths, ironmongery, and beer. Many of the inhabitants are employed as miners in the neighbouring mountains. In the neighbourhood is the Maria-Hilf-berg, a place of pilgrimage. Pop. (1885) 15,705.

Ambergris (i.e. 'gray amber'), a fatty substance, of an ashy-gray colour, with yellow or reddish streaks, like those of marble, which is found

in lumps of from half an ounce in weight to 100 lb. and upwards, floating on the sea, or cast upon the seashore in different parts of the world, and is also taken by whale-fishers from the bowels of the spermaceti whale (*Physeter macrocephalus*). Much ambergris is obtained from the coasts of the Bahama Islands; it is also brought from different parts of the East Indies, and the coasts of Africa, Brazil, China, and Japan. It is probable that all of it is produced by the spermaceti whale, and that it is a morbid secretion in the intestinal canal of that animal, derived from the bile. It is highly valued on account of its agreeable smell, and is much used in perfumery. The price is about 120s. an ounce. It has been strongly recommended for medicinal uses, but is scarcely employed in Europe; although in some parts of Asia and Africa it is much used as a medicine, and also in cookery as a condiment. The specific gravity of ambergris ranges from 780 to 920. It almost always contains black spots, which appear to be caused by the presence of beaks of the *Sepia octopodia*, the principal food of the spermaceti whale. It consists in great part (85 per cent.) of a peculiar brilliant white crystalline substance called *Ambrin*, believed to be identical with cholesterol, a constituent of human gall-stones, and which is obtained from it by treating it with alcohol.

Ambleside, a market village of Westmoreland, situated in the heart of the Lake District, about a mile from the head of Lake Windermere. Rydal Mount, for many years the residence of Wordsworth; Fox How, a summer retreat of Dr Arnold; and the Knoll, where Miss Martineau lived and died, are all in the neighbourhood. On account of the beauty of its surroundings, it is a favourite tourist resort. Coarse woollen cloths are made here. Pop. (1881) 1989.

Amblyopia (Gr. *amblyos*, 'dim,' *ops*, 'eye'). See AMAUROSIS.

Amblyopsis, a North American bony fish, found in the Mammoth Cave of Kentucky, and interesting as illustrating in the rudimentary condition of its eyes the effects of darkness and consequent disuse. It only measures a few inches in length, is colourless, and has its small eyes covered by the skin. It seems able, however, to hear acutely, and the wrinkles of skin on its head are regarded as special feeling organs. *Typhlochthys* is a closely allied genus found in the same surroundings, while another relative, *Chologaster*, occurring in the ditches of the South Carolina rice fields, is, as one would expect, open-eyed. The caves are tenanted by similar half-blind animals of various classes (see PROTETES, and CAVE-ANIMALS). Truly blind fishes are only found in the sunless ocean depths.

Amblys'toma, a genus of tailed amphibians in the gill-less or Salamandroid sub-order. It is the adult form of Axolotl (q.v.), from which it differs in its mode of respiration, and in a few external characters.

Ambo (Gr. *ambon*), a kind of reading desk or pulpit, which in early churches was placed in the choir. The epistle and gospel were read from the ambo, and sermons were sometimes preached from it. The ambo had two ascents—one from the east, and the other from the west. In the Roman churches there were two ambos, one on each side of the choir, from one of which the gospel was read, and from the other the epistle. The name ambo was also given to an eagle-shaped reading-desk.

Amboise, a French town in the department of Indre-et-Loire, on the Loire, 15 miles by rail E. of Tours. It lies in a region so rich in vineyards that

it has been called 'the Garden of France.' The town is memorable for the Huguenot conspiracy (1560), which cost the lives of 1200 Protestants, and as the place whence was issued the Edict of Amboise (1563), conceding certain privileges to the Huguenots. The castle of Amboise from 1431 was a frequent residence of the Valois kings; the birth and death place of Charles VIII.; and since the days of Louis XI., 15,000 prisoners are said to have been confined in its subterranean 'oubliettes.' Pop. 5000.

Amboise, GEORGE OF, cardinal and prime minister under Louis XII. of France, was born in 1460 near Amboise. In his 14th year he was made Bishop of Montauban, and in 1493 Archbishop of Rouen. Initiated in early years into the intrigues of court, by his zealous services he soon secured the confidence of Louis of Orleans, who, on his accession to the throne as Louis XII. in 1498, made him his chief-minister. Thenceforward Amboise, who in the same year received a cardinal's hat, became the prime mover in all the affairs of the realm; and it was by his advice that Louis undertook that spirited Italian policy which had such great influence on the fortunes of France. After the death of Pope Alexander VI. (1503), Amboise endeavoured to raise himself to the papal see, and having failed, became the dangerous enemy of the succeeding popes, Pius III. who occupied the papal chair only four weeks, and Julius II. To secure his own election, Amboise encouraged a schism between the French Church and the see of Rome, and convened a separate council, first at Pisa, afterwards at Milan and Lyons; but his plans were frustrated by the failure of the French arms in Italy. He died at Lyons, May 25, 1510. It was said that his vast fortune of 11,000,000 livres had been accumulated by not over scrupulous means.

Ambouyna, the most important of the Moluccas or Spice Islands belonging to the Dutch, lies SW. of Cerua, and NW. of Banda. Area, 365 sq. m. Pop. about 58,000, nearly a third Mohammedans. A bay runs into the island lengthways, forming two peninsulas, the northern called Hiu, and the southern, Leitimor. Ambouyna is mountainous, well watered, fertile, and healthy. Clove, sugar, mango, and cocoa nut trees are abundant, also fine timber for cabinet-work. The Dutch have diligently fostered the growth of the clove, and forced its culture by tyrannical methods. The Dutch took Ambouyna from the Portuguese in 1605. The British settlement was destroyed by the Dutch in the infamous Ambouyna massacre of 1623, for which, in 1654, Cromwell exacted compensation. The British held the island, 1796-1802. It became finally Dutch in 1814.

AMBOYNA, capital of the Dutch Moluccas, is situated on the NW. shore of Leitimor, on the bay of Ambouyna, and has a good roadstead. The government buildings are in Fort Victoria. Pop. about 9000.

Ambracia, a town in ancient Epirus, on the river Arachthos, north of the Ambracian Gulf. Colonised by the Corinthians about 630 B.C., it soon attained to great wealth and importance. Pyrrhus, king of Epirus, made it his residence. On its site stands the modern town of Arta (q.v.).

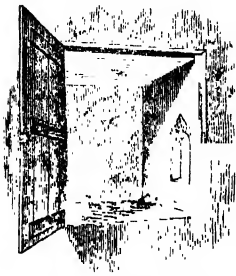
Ambriz, the northernmost division of the Portuguese territory of Angola, West Africa, extending from the Congo to the river Ambriz. The town of Ambriz was annexed in 1855, and was formerly the port of a small negro kingdom. See ANGOA.

Ambrose, ST., one of the most celebrated of the ancient fathers of the church, was born about the year 340, probably at Treves, where his father,

as Prefect of Gaul, was wont to reside. Ambrose received a fortunate omen even in his cradle: a swarm of bees covered the slumbering boy; and the astonished nurse saw that the bees clustered round his mouth, without doing him any harm. His father, perhaps remembering a similar wonder related of Plato, foreboded from this a high destiny for Ambrose. He received an excellent education, and went with his brother Satyrus to Milan, in order to follow the legal profession. He soon distinguished himself so much, that in 369 he was appointed, by Valentinian, Prefect of Upper Italy and Milan. In this office, his gentleness and wisdom won for him the esteem and love of the people, whose prosperity had been much injured by the troubles caused by Arianism. Accordingly, by Arians and Catholics alike, he was unanimously called to be Bishop of Milan in 374. He long refused to accept this dignity, and even left the city; yet he soon returned, was baptised, as hitherto he had been only a catechumen, and was consecrated eight days afterwards. The anniversary of this event (December 7) is still celebrated as a festival by the Catholic Church. Having sold his goods, and distributed the proceeds among the poor, Ambrose proceeded to fit himself for his new office by a course of theological study, under Simplician, a prosbyter of Rome. As a bishop, he won the universal reverence of all, by his mild and gentle character; but he was severe and stern against wickedness of every kind, even in high places. Thus, he repulsed the Emperor Theodosius himself even from the door of the church, on account of his having caused the rebellious Thessalonians to be cruelly massacred by Rufinus, excommunicated him, and only restored him to the church after eight months of severe penance. Only his unflinching defence of the court party enabled him to save the churches in his diocese from the Arian heretics; and his almost threatening earnestness probably contributed largely to the defeat of Symmachus, a wealthy prefect of Rome, who had petitioned for the restoration of the pagan worship, after the famine of 383. Ambrose's most valuable legacy to the church is his hymns, and the improvements he introduced into the service. The Ambrosian ritual, a use or liturgy still retained in the Milanese Church, is claimed for him, and he is the author of many hymns which he introduced into the Western Church. The hymn, *Te Deum Laudamus*, has been erroneously ascribed to him. For the *Ambrosian Chant*, see CHANT. Ambrose died in 397. The best edition of his works, generally ascetic in tone, and in which he followed in many things the Greek theological writers, is that published by the Benedictines (2 vols. Paris, 1686-90). Ambrose is the patron saint of Milan. The **AMBROSIAN LIBRARY** there, named in his honour, was established in 1609 by Cardinal Borromeo. It now contains 160,000 volumes of printed books, and 8000 MSS.

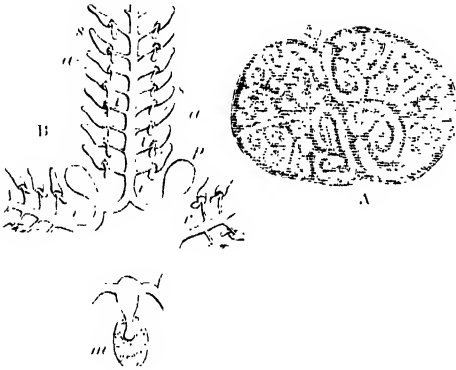
Ambrosia (formed from Gr. *ambrosios*, 'immortal'), in Greek Mythology, the food of the gods, as nectar was their drink. It gave to those who ate of it immortal youth and beauty. It was brought by doves to Jupiter, and was occasionally bestowed upon such human beings as were the peculiar favourites of the gods. Ambrosia was also used as a fragrant salve, which the goddesses employed to heighten their beauty: with which Jupiter himself anointed his locks; and which had the property of preserving bodies from corruption. The term was applied by Pliny, and by our early herbalists, to various plants. Hindu mythology has also its *amrita*, the beverage of the gods; and the gods of the Scandinavian pantheon were preserved in perpetual vigour by eating the apples guarded by Idun.

Ambry, a niche or recess in the wall of a church, shut in by a door, for the purpose of holding the vestments and utensils, such as the chalice, basins, cruet, &c. used for the service of the Mass. In monastic buildings, ambries were used for various purposes, such as keeping plate, hanging towels for the monks to dry their hands with before dinner, and the like. In this sense, the term ambry seems to have been applied to any kind of cupboard which was closed in and locked, and it is so used in Scotland at the present day.



Ambry, Rushden, Northamptonshire—14th century.

Ambulacral System (Lat. *ambulare*, 'to walk'), a term applied to a partly locomotor, partly respiratory, system in the Starfish (q.v.) group of animals. The term water-vascular is on the whole preferable. The system usually consists (1) of five radial canals, giving off tube-feet, which are



A, cross section of complex supply-canal of a starfish (the so-called siphon) (after Gegenbaur). B, diagrammatic plan of system in a starfish (after Gegenbaur): a, radial canals, giving off branches; b, to suboral tube-feet; c, with lateral and internal reservoirs or ampullae; d, e, central canal, with sub-reservoirs or Poiran vesicles; f, with supply of stone canal; g, h, and special entrance or madreporic plate; i, m.

generally suctorial; (2) of a circular canal surrounding the mouth, and uniting the oral ends of the five radials; and (3) of a special supply-canal, by which water enters the system. According to some, the water-vascular system of Echinoderms (q.v.) is essentially the same as that found in some worms.

Ambulance (Fr.), originally a *walking* or movable hospital, but, since the Crimean war, a wagon for the conveyance of sick and wounded soldiers. The term is sometimes erroneously used to designate the portion of the Army Medical Department which renders first aid to the wounded, and even that work itself.

The four-wheeled ambulance wagon used in the British army allows of two stretchers being run into it, for which purpose the *stretcher legs* are provided with small iron wheels. Three men can sit on the tail board, which lets down to form a foot-rest, and two others with an attendant (two) accompanies each wagon on a similar seat in front. There are a basket hanging from the roof to carry the men's arms and valises, water-buckets below the wagon, and a barrel of water on the splinter-bar. The roof is high, of waterproof canvas marked with

the Geneva cross, and the wagon is drawn by two horses driven postillion fashion.

During an action, the battalion stretcher-bearers (two bearers and one stretcher per company) pick up the wounded as they fall, and carry them to the dressing-station. In this work the men of the divisional bearer company assist, and, after the action is over, the *first line of ambulances* (10 per division), under a medical officer, drives on to the field, searches for and clears it of wounded, and carries them also to the dressing-station, which is close up, but if possible out of fire, in buildings, and near water.

The *second line of ambulances* (23 country or other wagons per division) is kept about half a day's march (5 or 6 miles) in rear of the field of battle. When required, the medical officer in charge of the dressing-station summons these conveyances, and the wounded are carried in them to the divisional field-hospital, which will have been established as near the front as possible, but quite out of fire, near a good road and water, and in buildings or tents. Each British army corps would have 25 field-hospitals, of which 12 would be horsed and march in rear of the corps, the remainder forming stationary field hospitals at the base of operations or at convenient intervals along the lines of communication. To these the wounded would be moved as soon as possible from the movable field-hospitals, which must always be cleared before an action.

Hospital or ambulance ships and trains, and mules with two cacolets or hammocks each, are also used for the conveyance of sick and wounded soldiers.

Ambulance wagons did not exist in the British army during the Crimea. The sick and wounded were carried by the sailors in hammocks, in ordinary transport wagons, and in ambulances borrowed from the French; nor were there any trained stretcher-bearers, field-hospitals, or hospital ships; the hands alone were available to carry away their wounded comrades and the regimental surgeons dressed their wounds on the field. To meet this deficiency, Lord Herbert's commission was appointed in 1857 and 1858, and effected considerable improvements, amongst others introducing into the service an ambulance wagon of similar type to that used by the French in the Crimea. Though restricted in military language to the wagon above described, the expressions *ambulance* (as of St John's or Red Cross societies) and *ambulance corps* are popularly used to cover the whole modern organisation for the immediate relief of wounded soldiers on the field of battle, called officially a *Bearer Company* (q.v.) in the British army, and a Sanitary Detachment in the German.

A *civil ambulance association* was originated in 1877 by the Knights of St John (q.v.), with the object of giving practical instruction respecting first aid to sufferers from accidents. Its success has led to the establishment of a St Andrew's Ambulance Association in Scotland, and of local centres throughout the kingdom. Classes are trained by its lecturers, and in most large towns ambulance wagons and attendants can be summoned by telephone from the society's office. Most members of the British police force now hold either the certificate or the higher medal of the association.

Ambuscade, a manoeuvre in warfare, whose general nature is indicated by the original Italian *imboscata* ('concealed in a wood'), but which now applies to any attempt to attack an enemy by lying in wait and coming upon him unexpectedly. The tactics of modern times render ambuscades unusual in civilised warfare. It is something more sudden and unexpected than a 'surprise.'

See Colonel Malleon's *Ambushes and Surprises* (1883).

Ameer, or AMIR, another spelling of Emir (q.v.).

Amelanchier (so called from the Savoy name of the medlar) is a small but widely dispersed genus of small trees belonging to the order Rosaceæ, sub-order Pomeæ, and planted in this country on account of their pretty foliage and racemes of white flowers, which appear early in spring. They are very hardy. *Amelanchier botryopium*, an American variety, is sometimes called June-berry, from its early ripening; and *A. ovalis* produces a pleasant fruit, which makes excellent puddings.

Amen, a Hebrew word of asseveration, equivalent to 'Yea,' 'Truly,' which has been commonly adopted in the forms of Christian worship. In Jewish synagogues, the Amen is pronounced by the congregation at the conclusion of the benediction given at parting. Among the early Christians, the prayer offered by the presbyter was concluded by the word Amen, uttered by the congregation (cf. 1 Cor. xiv. 16). Justin Martyr is the earliest of the fathers who alludes to the use of the response. In speaking of the sacrament of the Supper, he says that, at the close of the benediction and prayer, all the assembly respond 'Amen.' According to Tertullian, none but the faithful were permitted to join in the response. Up to the 6th century, it was the custom for those present at the Lord's Supper to utter a loud 'Amen' at the reception of the bread and wine, and to join in shouting 'Amen' at the close of the consecration. The same custom was observed at baptism, where the sponsors and witnesses responded vehemently. In the Greek Church, this word was pronounced after the name of each person of the Trinity; and at the close of the Eucharistical formula, the people responded. At the conclusion of prayer, it signifies, according to the English Church Catechism) *so be it*; after the repetition of the Creed, *So is it*. The Roman Catholic version of the New Testament (Rheims, 1582) substitutes Amen for the 'verily' of our Authorised Version, it being the word used in the original Greek. The Mohammedans also use this word in their service.

Amen-de-honorable (Fr., honorable compensation) was in France in the 19th century a public and humiliating confession made by traitors and other offenders in court, after being stripped of their shirts by the executioner, and having had other indignities inflicted on them. In England, the phrase is used figuratively of a full and frank apology sufficient to atone for the wounded honour of another.

Amendment, in judicial proceedings, means the correction of any errors or the supplying of any omissions in the record of a civil action or in a criminal indictment. The power to do this has been greatly extended of late and has largely improved and simplified the administration of the law, both in England and in Scotland. In criminal proceedings, greater strictness is observed, but in civil actions, almost any amendment will now be allowed by the courts which does not embarrass or surprise the opponent, and does not subject a larger property to the conclusions of the action, or does not subject the defendant in a larger pecuniary liability. The Judicature Act, 1873, and the Court of Session Act, 1868, are the main sources of this power in England and Scotland respectively.

In the United States, amendments were authorised to be made by courts of general jurisdiction at common law. The equitable power of amendment of pleadings and proceedings in the courts, and in all the various steps in a cause, has been conferred on the United States courts by acts of

Congress. The changes and additions made to the constitution of the United States during the last hundred years are called the amendments. The senate may amend money bills passed by the House of Representatives, but cannot originate such bills.

In British parliamentary procedure, the object of an amendment is generally to effect such an alteration in a question or motion as will make certain members vote in favour of it who, without such alteration, must either have voted against it, or have abstained from voting. This is quite distinct from the false amendment, which, like the 'previous question,' is intended to evade an expression of opinion on the main question, and which is effected by moving the omission of all the words in the question after the word 'that' at the beginning, and the substitution of other words of a different import. Proper amendments are obviously of great convenience to a deliberative assembly, because otherwise they would be compelled to express a positive or negative opinion upon the whole question as put. The amendment may even contain an alternative proposition wholly opposed to the original question. An amendment is generally put to the House in the form, 'That the words proposed to be left out stand part of the question;' the insertion or addition of new words being subsequently voted on. No amendment can be made in the earlier part of a question, after the later part has been considered. Words which have been voted to stand part of the question cannot afterwards be amended. An amendment of an amendment may be proposed, where the original amendment is simply to leave out words; and the original amendment becomes for the time the question. If the previous question is moved before an amendment, it must be voted on before the amendment, but it is obviously convenient that an amendment should be disposed of before the previous question. An amendment does not require notice, although notice is usually given. It must, however, be relevant to the question. Thus, when the question was as to Michael Davitt's capacity to sit in the House, an amendment for a free pardon was held irrelevant. These rules must be kept in view by those who desire to follow the proceedings of parliament. The amendments moved to public and private bills at their various stages are all technical in form, and all that needs be said is that, according to practice, amendments are not moved to the motion for the first reading of a bill. The rules adopted in parliament as to amendments to questions should, as far as possible, be followed by the chairmen of public meetings. In particular, it is desirable to dispose of one amendment before another is proposed.

Amenophis, AMUNOPH, or AMEN-HOTEP, is the name borne by three Egyptian kings of the 18th dynasty, beginning with Amasis or Aahmes I., about 1525 B.C. See EGYPT.

Amentaceæ, a vast order, of very varying limits, consisting of trees and shrubs, whose flowers are unisexual, the male flowers and very often also the female flowers, disposed in *amentæ* or Catkins (q.v.), and the perianth either wanting or incomplete. The Amentaceæ include as sub-orders the Cupulifere (see Alder, Birch, Hazel, Hornbeam, Beech, Oak, Chestnut) and the Juglandaceæ (see Walnut, Hickory). In the most comprehensive sense, the Amentaceæ are also frequently reckoned to include the Myrtaceæ (see Gale), the Casuarinaceæ (see Beefwood), the Salicaceæ (see Willow), and even the Piperaceæ (see Pepper).

Amenthes, the unseen world of the ancient Egyptians, the Hades of the Greeks, who borrowed their ideas about the lower world from Egypt. The

passage across the river, the islands of the blessed, Cerberus, and the judgment of the dead, all have their original in Amenthes, the localities of which, and the account of its divinities, are described in the famous Book of the Dead (q.v.), as well as in pictorial representations. The principal scene is the judgment seat of Osiris, the judge of the dead, before whom the dead are carried by the goddess Ma ('righteousness'), while Horus and Anubis weigh out their deeds. See EGYPT.

America. This name designates the western continent and its adjacent islands, forming the main body of land found in the western hemisphere. America has an area of about 16,500,000 sq. m., and is larger than Europe and Africa together. It is about four times as large as Europe, five times as large as Australia, and half as large again as Africa; but is considerably smaller in area than Asia. It is customary to regard Greenland as a part of America; while the adjacent island of Iceland, though in the western hemisphere, is usually associated with Europe. The other principal American islands in the Atlantic are Newfoundland, Cape Breton, Anticosti, Prince Edward Island, Long Island, the Bermudas, the Antilles or West Indies, Joannes, the Falkland Islands, Staten Land, and South Georgia. At the southern extremity of America lies the archipelago of Fuegia (Tierra del Fuego). In the Pacific are the Aleutian Islands, Kadiak, the Alexander and Queen Charlotte groups, Vancouver and other British-Columbian Islands; the Santa Barbara group, Revilla-Gigedo, the Pearl Islands, and others in the Gulf of Panama, the Galápagos, Juan Fernandez and the associated islets, Chiloe and the Chonos Archipelago. In the Arctic Ocean there are many large but unimportant islands.

The American continent consists of two principal parts, NORTH AMERICA and SOUTH AMERICA, which are connected by the narrow Isthmus of Panama. The two bodies of land, though very much in climate and productions, are much alike in several respects. Each is of triangular outline, with the shortest side to the north, and with a narrow southern prolongation. In outline, North and South America have each a certain resemblance to Africa. The two Americas have each a high range of volcanic mountains, extending from north to south along the west coast, a broad central plain, and a relatively low eastern mountain-range. Their great rivers have also some features in common, especially in regard to their direction. Thus the La Plata recalls the Mississippi, the Amazon the St. Lawrence; and the position and course of the Magdalena suggest comparison with the river Mackenzie. But there are some manifest points of contrast. North America has several large peninsulas, such as Labrador, Nova Scotia, Florida, Yucatan, Old California, Alaska, and others; while South America has no true peninsulas worth naming. North America sends to the Pacific four great rivers, the Yukon, the Fraser, the Columbia, and the Colorado; while South America pours but little water into the Pacific. Besides the three great South American rivers already named, there are the Orinoco, the São Francisco, the Rio Negro, and a few other considerable streams that flow directly to the ocean; while in North America we find the Saskatchewan, Nelson, Penobscot, Hudson, Delaware, Susquehanna, Potomac, James, Cape Fear, Savannah, Mobile, Brazos, and several other important contributory rivers. There are also two great North American inland seas, Hudson Bay and the Gulf of Mexico; but nothing of the kind is seen in South America.

America is called the New World; and from the historical point of view, this name is obviously appropriate; but geologically it may be called the Old World, since the oldest known strata have their widest development on its surface; and there have been here found relics of prehistoric man, which must be regarded as among the oldest yet discovered.

NORTH AMERICA has an area of more than 9,000,000 sq. m. It is considerably larger than South America, which is in turn larger than Europe and Australia combined. Of the two great meridional lines of uplift, the western (that of the Rocky Mountains and their subsidiary chains) is vastly the greater, not only in height, but in breadth and length. From Alaska, in the NW., it extends throughout the Pacific coast-region. Near the two extremities volcanic activity is still great; but it is at present much more noteworthy in Central America than in Alaska. North of Mexico there is very little evidence of much very recent volcanic activity till we reach the Alaska peninsula and the Aleutian Islands. Through those islands the volcanic chain makes a direct connection with the volcano-systems of Kamchatka, the Kuriles, Japan, Formosa, the Philippines, and the Malay Archipelago. Except those of the West Indies, all the active American volcanoes are found near the Pacific. In 1886 a series of destructive earthquakes occurred, which had their centre near Charleston.

The western mountain system of North America comprises a very great number of minor ranges, mostly having a north and south direction. The main chain (Sierra Madre) cannot be said to preserve an unmistakable identity throughout. The Coast Range, the Sierra Nevada, and the Cascade Mountains are the most noted of the western parallel ranges; they all lie on the Pacific slope, and they contain some of the highest of North American peaks. The elevated plateau called the Great Basin (chiefly in Utah and Nevada, U.S.), contains the Great Salt Lake and several smaller bodies of strongly saline water, evidently the remains of a much larger lake which once sent its waters to the sea; although at present the waters of the basin are all evaporated, its streams and lakes having no connection with the ocean.

The eastern or great Appalachian mountain-system has a general NNE. direction, nearly parallel with the Atlantic coastline. Like the Brazilian mountains of South America, it is geologically much older than the corresponding western range; it is also far less elevated. The Appalachian Mountains begin at the south in the broken tableland of Alabama. Through the Alleghanies, the Cumberland, the Blue Ridge, and other parallel and variously named local ranges, they connect directly with the Catskills, the Shawangunk Mountains, the Helderberg Hills, and the Highlands of New York. Thence they continue NE. through the Green Mountains of Vermont, the Notre Dame Mountains and the Shick-hoe of Eastern Canada. The mountains of Newfoundland, and the Watchich ridge of Labrador may be regarded as parts of the Appalachian system.

North of the St. Lawrence River, the vast and complicated mountain-system of the Laurentides is seen. These mountains extend from the Atlantic westward to near Lake Superior; while to the NE. they send a continuation into the Labrador peninsula. The height is nowhere very great. The Adirondacks of Northern New York are regarded as an outlying portion of the Laurentide system.

The highest mountain in North America is probably Mount St. Elias in Alaska, 19,500 feet high. In the Cascade range are Mount St. Helena, 15,750

feet; Mount Hood, 11,934 feet; Mount Tacoma, 14,444 feet. In California, and chiefly in the Sierra Nevada, are Mount Whitney, 14,886 feet high; Mount Shasta, 14,440 feet; Mount King, 14,000 feet; Mount Tyndall, 14,386 feet.

From near Mount Brown (16,000 feet) and Mount Hooker (15,700 feet) flow the Saskatchewan, Mackenzie, Fraser, and Columbia rivers. In like manner the numerous group of lofty mountains in Central Colorado sends out the rivers Arkansas, Platte, Rio Grande, and Colorado. Among the highest mountains of Colorado are Mount Wilson, 14,280 feet high; Lincoln, 14,297 feet; Evans, 14,330 feet; and Howard, 14,208 feet. A very large number are over 13,000 feet high. The highest point of the Alleghany system (Mount Mitchell) is only 6688 feet high. Mount Washington, in New Hampshire, reaches 6293 feet. Among the Adirondacks, Mount Marcy (5344 feet) is the highest. In Mexico, Popocatepetl reaches a height of 17,884 feet, while Orizaba is 17,373 feet high.

A very remarkable feature of North America is the great central plain which reaches from the Arctic Ocean to the Gulf of Mexico. Its northern section is drained by the Mackenzie River; the central districts belong in part to the Saskatchewan-Nelson basin (whose outflow is to Hudson Bay), and in part to the St. Lawrence system; while the southern half is mainly drained by the Mississippi. The only important break in the continuity of this great plain occurs in the Ozark Mountain region of Missouri and Arkansas. These mountains are low and irregularly disposed; they are connected by a low ridge with the Rocky Mountain system. A prominent feature of the central plain is the *Haute des Terres*, a high rise, whence now the Mississippi, the Red River, the St. Lawrence, and the Winnipeg. This ridge is nowhere over 2000 feet high, and its ascent is extremely gradual. To the N.E., however, there is a marked, though not very apparent slope towards the tidal waters of Hudson Bay. The general elevation of the central plain of North America is not very great. It is remarkable that to the eastward for a great part of its extent it is not bounded by any mount in wall, the western ridges of the Appalachian system sloping very gently to the westward, although their eastern faces are often steep and abrupt. The western part of the great valley is much higher than the eastern; and most of the foot-hill region east of the Rocky Mountains, like the valleys which intervene between the main mountain ridges, has an elevation of from 500 to 6000 feet. The Andalusian plateau ranges from 6000 up to 8000 feet.

The most general name for the great plains of North America is *prairie*; but in its present American use, the term has lost something of its original meaning in the French language, and acquired some new modifications. For the most part, the word designates a treeless plain, but there are local distinctions between *timbered* and *barb* or treeless prairies; and many plain, at one time bare of trees have become well timbered through the operations of natural or other causes. There is little doubt that the former prevalence

whether tree planting will ever increase the now insufficient rainfall of the high plains which border the Rocky Mountain region on the east. The prairies of North America vary much in respect of geological age, though very little of their area rests upon azoic strata. Few prairies are of a dead level surface, and many are 'rolling'—that is, their surface is a succession of low wave-like swells and depressions. Often there are shallow ravines or *culeers*, which, like the wady-valleys of Arabia, may represent the courses of ancient streams. The plains often rise over the level of their rivers by a succession of 'benches,' or terraces, which in North western Canada are mis-called *steppes*. Geographers have extended the North Asiatic term *tundra* to the marshy and sphagnum plains of sub-arctic America. In the extreme south, many of the grassy plains are locally termed *savannahs*; and along the Lower Mississippi and its delta are found the singular *prairies tremblantes*, or quaking plains, which shake beneath the tread. Many of these *prairies tremblantes* afford pasturage for herds, and some are crossed by lines of railway. It is believed that in such cases the lower strata are highly charged with water, while the surface is rendered firm by a network of roots, which in some cases is buoyed up by collections of marsh gas. In general, the true prairies have a very strong and tough sod, but after thorough ploughing, the surface becomes friable, and the soil generally proves highly productive. There are, however, prairies with a light and sandy soil, and with small agricultural capabilities. In other places, sand hills and hard flinty ridges occur. Toward the Rocky Mountains, irrigation is generally necessary, and the grazing (ranching) of cattle and sheep replaces, to a great extent, the operations of agriculture.

The coast line of North America on the west is almost everywhere high and rocky. To the south of Puget Sound good harbours are rare; but British Columbia and Alaska have great numbers of good seaports, the coast-line being, in many places, deeply cut with high-walled fjords, or 'canals,' and elsewhere sheltered by ranges of high and well-wooded islands. The Atlantic coast, to the north of New York Bay, is generally rocky and well sheltered with islands, and has abundance of good natural harbours; but south of the parallel of New York, the coast of the mainland is almost everywhere low and sandy. Many of the best ports are formed by river mouths, and have sand-bars across their entrances. Nowhere else in the world is there any such extent of low and sandy coast as on the Atlantic and Gulf seaboard of the United States.

Hydrography.—The fluvial hydrography of North America is very remarkable. In general, Canada and the Atlantic slope are well-watered and have abundant rains. Along a narrow strip on the Pacific slope, from San Francisco southward to Acapulco, the water supply is deficient, and the interior regions near the coast have locally a desert character; while from Acapulco southward the rainfall is ample for all needs. As will be seen farther on, there is a marked analogy in this

portion of the surface. The planting of trees, stimulated by bounties and by other favouring legislation, has been extensively undertaken, and in many places has succeeded beyond expectation. There is still a difference of opinion as to

of cattle. But in the Canadian part of the central valley there is ordinarily no deficiency of rainfall. In the Rocky Mountain region, the summers are generally very dry; and in some sections, irriga-

tion is required in order to produce crops. Still the great volume and length of the North American rivers, and the immense number of lakes, are sufficient proof of the amplitude of the general rainfall. In Canada, the lakes and rivers are especially numerous. It is stated that the St. Lawrence, with its tributary lakes and rivers, contains one-half the fresh water of the globe. In the Rocky Mountain region of Canada, the great rivers, Yukon, Fraser, Columbia, Saskatchewan, and Mackenzie take their rise. Between these mountains and Hudson Bay, a girdle of vast lakes, or inland seas (Great Bear, Great Slave, Athabasca, Deer Lake, Winnipeg, and others), are seen to form a regular succession running from the Arctic Circle in a SSE. course to Lake Superior (350 by 100 miles), which is itself the largest fresh water lake in the world, and the first of a wonderful chain of great sea-like expansions of the Upper St. Lawrence. The line of these great lakes (from Great Bear Lake to the Lake of the Woods inclusive) marks the eastern limit of a fertile prairie region resting on fossiliferous rocks. East of this line we find a vast wilderness of 'Barren Grounds' and swamps, mostly unfertile, and geologically composed of azoic rocks. North of the St. Lawrence system, almost the whole country is thickly studded with lakes, which, with their connecting streams, form a network of important water-ways traversable by canoes and boats. They nearly all swarm with valuable food-fishes, and many of the streams are capable of affording immense water-power. The river Saguenay is noted for the awful grandeur of its scenery. The Ottawa is the largest tributary of the St. Lawrence, which is itself the largest in volume of North American rivers. Among the other large tributaries are the St. Maurice, the Richelieu, the St. Francis, and the Chaudière.

The Atlantic slope of the United States is well supplied with water, and many of its streams afford extensive navigation. The river Hudson, noted for its fine scenery, is remarkable as a deep tidal channel, affording the only naturally navigable water-way through the Appalachians. The Potomac is one of the noblest of American rivers; and important streams flowing to the Atlantic are the St. John, the Penobscot, the Kennebec, the Merrimac (noted as affording more utilised water power than any other river in the world), the Connecticut, the Delaware, the Susquehanna, the James, the Chowan, the Tar, the Neuse, the Cape Fear, the Great Pee Dee, the Santee, the Savannah, the Altamaha, and the St. John's, nearly all navigable in their lower courses. The chief rivers flowing to the Gulf of Mexico are the Appalachicola, the Mobile, the Pearl, the great Mississippi, the Sabine, the Trinity, the Brazos, the Colorado of Texas, and the Rio Grande. The last named river forms a part of the boundary between Mexico and the United States, and is the only very considerable stream of which any part is in Mexico, excepting the Colorado of the West (of which the mouth and lowest section are in Mexico), and the Santiago on the western slope. The United States portion of the great central plain is principally drained by the Gulf Coast rivers, and chiefly by the Mississippi (q.v.) and its great affluents. But a considerable part of this region has its outflow into the St. Lawrence, through the great lakes; and in the north, another area sends its waters to Hudson Bay, through the Nelson River. Along the crest or divide between these river-systems in Dakota and Minnesota, many lakes are found, some of them with no outlet. Of these last lakes, some are saline or brackish. Devil's Lake is the largest of these salt lakes.

Of the many large Alaskan rivers, the principal is the Yukon, which pours a vast flood into Behring (properly Bering) Sea. This is a channel of some steam-communication in summer. The Kuskokwim is another large stream of Alaska. The Fraser is a swift and strong river, flowing in a region of high mountains. The great river Columbia is noted alike for its navigation, its salmon-fisheries, and its enormous cataracts. The Rio Colorado, whose waters flow to the Gulf of California, traverses a desert plateau. Here, nearly every water-course runs in a deep-walled cañon—a narrow valley with precipitous sides, often of prodigious height. Many of the cañons are dry the greater part of the year. When rains occur, they wash the detritus of the rocky surface into the streams; and the swift waters, heavily laden with sharp sedimentary matter, act like a chisel in cutting away the bottoms of their own beds. In this way the cañons have been formed. The very aridity of the country has thus helped the process of cañon-formation, and of the consequent over-drainage of surface-strata. In a part of the Grand Cañon, the Colorado flows at a depth of 7000 feet below the general level of the country.

Climate. The winter cold and the summer heat of North America seem, as a rule, to be extreme, when we consider the latitudes. Variations of temperature are more sudden and more extreme than in South America or Western Europe.

The arctic portion of North America has a climate of extreme severity; and much of the northern sub-arctic region has a decidedly arctic climate. Thus the Labrador peninsula is in the main a most forbidding and desolate expanse, covered with rocks and precipices, and having a winter far more rigorous and inhospitable than that of Lapland, or even Siberia. In the west, however, the corresponding region is nearly as mild as that of sub-arctic Europe; and Southern Alaska, at the coast-line, has very warm though rainy winters. Crossing the Rocky Mountains of Canada, we find the western half of the great central plain has not only a fertile soil, but a climate such that wheat can be grown even in the region of the Peace River; and it is asserted that the Mackenzie River valley is in part well adapted to cultivation, almost as far north as the Arctic Ocean. Yet the Barren Grounds west of Hudson Bay are altogether unfit for agriculture, and the same thing is true of much of the swampy and wooded region north of the Athabasca. But with every allowance, it remains certain that a very large part of the unsettled portion of North-western Canada is extremely well adapted to the growth of barley, oats, and spring-wheat of the very first quality. The winters of this region are severe, but quite endurable; and it is their length rather than their severity that makes them dreaded by settlers. In that part of this region lying north of the Canadian Pacific Railway, the present scanty population is made up almost entirely of Indians. There are no roads; summer travel is effected by canoes; while in winter the traveller finds a swift conveyance in sledges drawn by dogs.

Passing south of the Canadian line, we are still in the spring-wheat belt; and not till we go south 4 or 5 degrees of latitude do we enter the winter-wheat belt. Maize is planted in the warmer parts of Canada, and in nearly all the more southern parts of North America. The other cereals grown in the United States are much the same as those ordinarily produced in Europe. Sorghum is a large annual grass or cane extensively grown in various parts of the United States as a sugar-producing plant. True sugar-cane is raised only in the most southern parts of the United States, and in lati-

tudes still farther south. Tobacco is an important crop not only in tropical America, but nearly as far north as Canada. Cotton reaches its northern limit in California, Missouri, and Virginia. True rice is grown in the more southern United States; and an interesting though uncultivated native cereal called 'wild rice' (*Zizania aquatica*) grows in various parts of North America, and in some places its seed is extensively collected by the Indians. Throughout the Atlantic and Gulf slopes of North America, the winter climate is much more severe than in corresponding European latitudes. It will be observed that nearly all the cultivated crop-products of North America (except maize, potatoes, and tobacco) are of Old-World origin. The same thing is true in a less degree of the cultivated fruits. The European apple thrives even better in North America than in Europe; so likewise do the peach, the pear, and other fruits. But the grapes generally cultivated in America are of native or hybrid origin; although the European grape does well in California and Mexico. The cranberries, strawberries, and some of the other cultivated small fruits of North America, are of native origin, as are some of the more hardy varieties of the plum. Sub-tropical fruits, such as the orange, fig, and lemon, do well in that limited part of non-tropical North America which lies south of the frost line.

Geology. The geology of North America is a subject of much interest. The Laurentides and Adirondacks are composed chiefly of azoic rocks of remote geologic epoch. In the New England States, granite and gneissoid rocks are very common, and injected dykes of very ancient date are abundant. Where palaeozoic rocks are found in this region, they are often highly metamorphic. In no part of the world are evidences of glacial action more extensive or more interesting than in the northern two-thirds of North America. Throughout the Appalachian region, Silurian, Devonian, and Carboniferous strata are found, ranging from Newfoundland SSW. to Alabama; and coal-bearing strata are largely developed from Pennsylvania southward. Limited areas of coal occur in Newfoundland, Nova Scotia, and Massachusetts. West of the Alleghanies, true coals occur in most of the United States east of the Mississippi. But the coals of North Carolina, and some in Virginia, are Triassic. Nearly all the coals of Mexico, of the Pacific States, of the Rocky Mountains, and of the North-western Canada region, so far as is now known, are of either Tertiary or Cretaceous age. Though classed as lignite, many of them are excellent steam coals, and some of them coke well, and are very serviceable in smelting operations. Strata belonging to nearly every recognised geologic period are discoverable in North America.

It is believed that a considerable share of Eastern Canada, together with a great part of the New England states, occupies the site of two or more large islands which together formed the most extensive surface development now existing of the oldest sedimentary rocks. Similar island probably existed at various points along the great western Cordillera, both in North and South America, as well as in the West Indies, Guiana, and Brazil; and the building of the continent was essentially a process of extension, through which the spaces intervening between the various island-groups were converted into land. Enormous growth of the land areas was made during the Silurian period, and still greater before the close of the Devonian and Lower Carboniferous times. There is no doubt that the coal measures of North America, richer as they are now stored, were once much richer than at present. Glaciers have ploughed into the great coal-beds, torrents and floods have stripped large

areas of the underlying rocks of their coaly covering, and the heat and pressure of injected dykes have graphitised some beds and burned up others. The greater part of the present Appalachian system of ridges and folds did not exist except in embryo, until about the close of the Palaeozoic era. The great central plain of North America must have been mainly upraised by slow

as the Cretaceous period, the strata of which, extensively developed to the east of the Rocky Mountains, have yielded the remains of many gigantic saurians, as well as of those wonderful toothed birds (*Odontornithes*) which have of late attracted the notice of naturalists everywhere. The Cretaceous seas seem to have been in great part converted into a land-surface before the beginning of the Tertiary period. But after the Cretaceous epoch had closed there remained great lakes and marshes, in the beds of which are now found remains of many wonderful mammalian forms. From the Miocene downwards, edentate remains, often of large sized animals, are abundantly found in North America, although at present there are only a few living species known. Professor O. C. Marsh believes that North America is the original abode of the edentates. Far less abundant, though still plentiful, are remains of rodents. Various species of elephants also existed. The entirely extinct amylod mammals were apparently peculiar to North America. Tapiroid, camel-like, and other mammals in great variety have left their bones in the Tertiary strata of the continent. The American species of rhinoceros probably became extinct before the end of the Pliocene time. The equine remains include some which may be regarded as relics of true horses; and it is supposed that the introduction of horses from Europe to America was simply a restoration of the species to its original habitat.

The Rocky Mountain region, in its present shape, is of much later geologic age than the Appalachian country. Vast lava-fields occur, and there are numerous craters of volcanoes, not long extinct. The most powerful of known geysers, or intermittent thermal springs, occur in North America, chiefly in the Upper Valley of the Yellowstone River. Iron is abundantly developed in the Laurentides and in the Appalachians, and ores of a great variety of grades occur in almost every part of North America. The Lake Superior region and the state of Missouri are especially rich in iron ores. Some of the Cuban ore are of especial excellence. The states of Pennsylvania, New York, Ohio, Tennessee, and Alabama are prominent as seats of the iron industry.

Gold has been largely obtained from Mexico and Central America, from the Pacific slope and the Rocky Mountain region, from the Black Hills of Dakota, and from many places about the Appalachian range, including localities ranging from Alabama to Nova Scotia. Silver ores are richest in Colorado, Nevada, and Utah; but argentiferous galena is widespread, occurring from Newfoundland, Eastern Canada, and Maine, to Mexico and to Lake Superior. Lead is largely produced in the silver regions, as also in Missouri, Iowa, Illinois, and Wisconsin. Petroleum has a rich development in Western Pennsylvania, and the adjacent districts of other states; also in Ontario and in Southern California. The celebrated wells of natural gas, chiefly in Pennsylvania and adjacent states, afford much valuable fuel to iron-works and other industrial establishments. The asphalts of Cuba are reported to be singularly rich, but they are surpassed in value and availability by those of the island of Trinidad, which is in reality South American. Salt is found extensively in Ontario, Michigan, New York, Louisiana, and the Great

Basin. The copper of Lake Superior and of Arizona is of very high importance.

Natural History.—The zoology of North America is rich and varied. Here occur the bison (nearly extinct of late), the musk-ox, the Rocky Mountain sheep, two antelopes (the pronghorn and the Rocky Mountain goat, the former remarkable as the only antelope with branched horns, and the only one known to have deciduous horns), the reindeer, the elk or moose, the wapiti and several other deer, five species of bear, the walrus, sea and river otters, fur and hair seals, wolves and foxes of various species, the beaver, several hares, the raccoon, the marten, mink, and skunk, two or more marmots, a true polecat, a badger, the wolverine, and a large number of minor fur-bearing and other mammals. There is only one marsupial found—the opossum. Of feline animals, the puma and lynx are the most widely diffused; the jaguar and ocelot are found in the warmer latitudes, where occur the pécary, and even the tapir and other South American forms. Tropical North America has not nearly so many species of the monkey tribe as occur in South America. In Mexico and Central America, there are found many animals of distinctly South American type. The avi-fauna is singularly rich. All the humming birds are strictly American; but the North American species are far less numerous than the South American. The vultures of America are entirely distinct in structure, though not in habits or appearance, from the old-world species. Many American birds are very rich in plumage; the song birds, as a rule, are more remarkable for sweetness and delicacy of note than for volume of sound. A very large proportion of the known species of tailed batrachians are North American. Of the animal kingdom, it is believed that North America has afforded only one native species now truly domesticated—viz. the common turkey. The native tropical American fauna is one of the richest and most strongly marked anywhere known. Among reptiles, we find the rattlesnakes (some of which are South American). The 'Gila Monster' (*Diplacodon horridum*) is the only venomous lizard known in any part of the world. There are many valuable food-fishes occurring in the rivers and seas.

The flora of North America has strong marked features of distribution. The plants of the far North belong in many instances to species which are natives of Europe also. The flora of the Atlantic States has many species and genera in common with that of Eastern Asia. Many of the Atlantic species are remarkable for an extensive range north and south, which persists in spite of great local differences of climate. The West Indian flora (essentially South American) would appear to have only of late invaded peninsular Florida, along the southern shores of which it has established itself to a remarkable degree. Westward, the highlands of Mexico seem to have acted as a barrier against the northward spread of tropical forms. North America abounds in great forests of valuable timber-trees in great variety. Most of the trees are congeneric with European timber-trees; but only a few arboreal species are found alike on both continents; neither are there many species found on both sides of the Rocky Mountains. The dense forests of the Pacific slope are largely made up of coniferous trees, mostly of species not known on the Atlantic slope. Manzanita, logwood, and lignum-vite are extensively produced in the tropical section. Since colonisation began, a very great number of European plants, chiefly grasses and weeds, have naturalised themselves in the country. On cultivated North American native plants, we may pecily tobacco,

maize, the common potato (perhaps originally South American, as the tomato is), cacao, vanilla, and some species of melons; also gourds, beans, capsicum, and indigo.

Ethnology.—The native peoples of North and South America alike would appear to have been all of one race, although the Eskimo of the far North resemble the 'Indian,' or copper-coloured native races, not so much in appearance and in physical features, as in the polysynthetic or incorporative character of their system of word-building. This polysynthesis differs in kind as well as in degree from the agglutination observable in so many North Asiatic languages. It has indeed no exact counterpart in any Old-World tongue, but something resembling it is seen in the language of the Basques. The polysynthetic languages have, as a rule, very long words, or combinations, which in fact represent sentences rather than words. The number of native languages and dialects is very great indeed; and in such languages as have received no alphabetic standard, the vocabularies and pronunciation of words are subject to continual changes. Further notice of the red men and of their ancient centres of semi-civilisation is contained in the article AMERICAN INDIANS.

The present population of North America contains a copious element of the Indian stock, chiefly found in the remoter parts of Canada and in Mexico and Central America. In Spanish America and in Manitoba (Canada), there are many persons of mixed white and Indian origin. The Spanish language is spoken in Central America, Mexico, Cuba, and Puerto Rico; French prevails in parts of Canada and Louisiana, and in some of the West Indies; and a German dialect prevails locally in Pennsylvania. But by far the largest share of the North American people are English in language, if not in descent.

Antiquities. In addition to the facts cited in the article AMERICAN INDIANS, it may not be amiss to notice here certain geographical areas noteworthy for some peculiarities in respect of their archaeological remains. It may be said in advance that most of the more modern authorities reject the theory that the interesting earthworks and other remains of remote antiquity in America are to be ascribed to a race of 'mound-builders' distinct from the present stock of Indians. The fact that the semi-civilised peoples of Arizona and New Mexico have plainly and unmistakably the same general characters as the other aboriginal races seems decisive on this point. The works of the 'mound-builders' are chiefly found in the Ohio and Mississippi valleys; but examples are to be met with at least as far north as Winnipeg. Those of Wisconsin are frequently built upon a ground plan evidently designed to imitate the form of some animal, as the tortoise, serpent, bear, or even man.

Farther south they are generally pyramidal or conical, and not of them truncated. They are usually of earth, or of earth and stone. Many are clearly sepulchral, others apparently designed for sacrificial or other religious purposes, and a few seem like fortifications. Not infrequently the mound proper are inclosed by square, circular, or polygonal earthworks, often very regular in outline. The sepulchral mounds often contain human remains, as well as weapons and utensils of stone, bone, or native copper. The style of art here observed is, for the most part, decidedly that of the existing North American tribes. The identification of certain images found in Arkansas with the well-known figures of Buddha is, for the present at least, to be received with much caution. In many instances the mounds are overgrown with large and dense trees, and there is no doubt that in many cases the tumuli are of great age; but again there

are mounds which, according to the traditions of settlers, were built within the historic period; and to some of these a fixed date is assigned in local annals.

The now unpeopled cliff-dwellings of the Arizona cañons recall the similarly-situated prehistoric houses of the Balearic Islands, and the cliff towns of the island of Thera (Santorini) in the Ægean, which last are still inhabited. When the Spaniards conquered Central America they found cañon towns with many inhabitants. Certain loftily-built meso-towns (like Acoma, in New Mexico) are entirely paralleled by such places as Albinnen, in Switzerland, which is only accessible by means of a succession of wooden ladders. There is, however, reason to assign to many ruined North American towns a very high antiquity, since the irrigation-works which sometimes are found near them could not have been available or useful except in times when the climatic conditions were very different from what we observe at present in those arid regions.

The far more remarkable architectural remains of the old Mexican, Peruvian, and Nicaraguan civilisations are noticed under the names of their respective countries. Perhaps independent of all these was the very noteworthy advancement of the Chibcha race in Colombia.

Political Divisions.—The political divisions of North America are (1) Danish America, which includes Greenland, and three small islands of the Virgin group in the West Indies. (2) British North America, in which division we may place the Dominion of Canada, Newfoundland, Labrador, the Bermudas, the numerous British West Indian islands, and British Honduras. (3) The United States, including the detached territory of Alaska. (4) Mexico. (5) The Central American republics of Honduras, Guatemala, Salvador, Nicaragua, and Costa Rica, together with a small part of the state of Panama, which belongs to the South American republic of Colombia. (6) The West Indian republics of Hayti and San Domingo. (7) The Dutch West Indies. (The Venezuelan islands, together with many others reckoned as West Indian, are clearly more South American than North American in character.) See table on p. 223.

The population of North America is not less than 65,000,000, of which probably 5,000,000 are of pure or mixed Indian descent. The very great majority of North American Indians are found in Mexico and Central America. The people of African stock number at least 8,000,000, most of whom are natives of the United States. The original slave element was derived from almost every coast region of the African continent.

Colonisation.—The original colonisation of North America, so far as Great Britain was concerned, was for the most part a true *colonisation*, by families, and was chiefly voluntary; although Great Britain, as well as several other European countries, both before and after the American Revolution of 1776, shipped many convicts and paupers to America. The immigration from England and Scotland has mainly fixed the type of civilisation alike in the United States and in Canada. The French colonisation was a very different affair, earned largely at the public expense, and receiving the fostering care of church and state alike. Spanish colonisation was to a great extent the work of adventurous persons, bent on the acquirement of fame and fortune in the gold-fields. The Dutch settlements were almost purely commercial in their spirit. The large and early German immigration was, in a great degree, the movement of members of Protestant dissent sects to a land of religious liberty, even more largely was it a result of the Franco-German wars of the 18th century, leading to the wholesale

expatriation of the people. Irish immigration began as early as Cromwell's time, and was at first in part compulsory. Since the year 1815 it has immensely increased in volume. The newer German movement to America has been, and still is, very large. Many thousands of Scandinavians have in recent years found homes, chiefly in the northern part of the Mississippi Valley. There has also been a large and quite recent Slavie influx, chiefly Polish, Czech, and Illyrian, to North America. Italy is also sending out many settlers, chiefly of the humble labouring classes. The so-called Hungarian element has been largely introduced on labour-contracts, which often provide for the return of the labourer, after a fixed time, to his own country. This system is liable to many abuses, and in the United States its exercise is forbidden by law. The introduction of Chinese labour, on a similar contract system, was not long since very prevalent; but that practice is also illegal in the United States.

North America has for more than two centuries been the principal objective point for European emigration. This has been chiefly directed to the United States, where public lands have been sold on the most liberal terms, or given to actual settlers. As a consequence, the amount of public land suitable for agriculture has become greatly reduced; but there are still large tracts of land owned by the railway companies and capitalists, and offered for sale to immigrants at very reasonable rates. Since the overthrow of the slave system in the Southern States, that section has attracted many settlers. In Canada there are still vast and unoccupied areas of fertile soil available for settlement. Mexico has much unoccupied territory, but its climate and social conditions render it less attractive to immigrants from the north than to those from the south of Europe. For the former, the United States and Canada are more suitable, since for the most part no process of acclimatisation has to be gone through. European immigrants, as a rule, live out the full term of their years in North America, and life-insurance tables assign a longer probable term of life to Americans than that agreed upon by European insurance companies. The diseases the immigrant has to encounter are much the same as those of Europe. Pulmonary consumption is common in the Atlantic States, especially in places where the soil moisture is great and changes of temperature frequent and extreme. Malarial fevers prevail in many newly-settled districts, and in places having alluvial soils. Fevers and intestinal troubles appear to prevail more extensively in southern than in northern latitudes. There are theorists who hold that the European race in North America must decline in vigour and in physical and mental strength; but the facts, so far as known, do not appear to warrant any such opinion.

The intermarriage of white persons of different national origin may ultimately lead to a modification of the now familiar American type of figure and feature. The American of European descent is often spare and even delicate in outline, and slightly taller, on the average, than his European relative. Activity and quickness are common mental and physical attributes. Mechanical invention is a field in which American enterprise has greatly distinguished itself. The struggle for wealth and for material success is intense in North America, and as a consequence intellectual pursuits, literature, and the fine arts have had less encouragement here than in some of the mother-countries. Nevertheless, popular education is nowhere better provided for than in the United States and Canada. Institutions for the higher education

are numerous, and many of them are well endowed and highly efficient. What may be called the American branch of English literature is already noteworthy for the volume, if not for the value of its outcome; and the tendency is every year towards a higher standard of literary merit. In science, the American mind has very naturally been turned towards practical rather than theoretical work; yet, even in pure science, much excellent work has been done in America.

It may be added that the prejudice which undoubtedly exists in some parts of Europe regarding all things American has led, and does still lead, some critics to minimise and undervalue American science and literature. It may be confidently asserted that life in the New World is neither so sordid and materialistic as hostile critics would have the world believe, nor yet so ideally perfect as mistaken patriotism might claim. It may be further said that the poor man, as a rule, has a happier and more hopeful lot in America than he can have in an old country, where social conditions are long established and comparatively unyielding.

It is stated by many observers that in Mexico and Central America the Indian element is gaining upon the white, and that the 'Ladino' (half-breed, or mixed) element is becoming more and more Indianised. Such statements should be received with caution, since trustworthy census reports are entirely wanting. It is certain, however, that in recent years there has been a marked decline in the number and extent of those civil wars which have formed such a prominent feature in Spanish-American life. Railways have also met with great extension, and there is a strong movement for the introduction of popular education, and the development of material resources. Brigandage and assassination have also been much repressed. The quiet and uneventful life of these countries in time of peace seems, to a traveller of northern origin, a proof of the indolence and lethargy of the people. The pursuits of the natives are pastoral rather than agricultural; and their manner of life is at once oriental and medieval, oriental in its dreamy, aimless, and leisurely methods, and medieval in the lack of public feeling of the people generally, as much as in their simple credulity, and their unquestioning charity towards the poor.

The details of the agriculture of North America, as well as those of its manufacturing and mining interests, its canals, railways, and telegraphs, are more fully noticed under the heads of its respective states, especially in the articles on the United States and Canada. About nine-tenths of North America is in what is called the temperate zone, though we have seen that a considerable share of this region has an arctic climate. In like manner, a considerable part of tropical North America has a temperate, or even a cool climate. This is especially true of the plateaus of Anahuac and Oaxaca in Mexico, where the altitude is such that the temperature is singularly cool and equable, though the country suffers from drought. The region properly called *Central America* is the high mountainous body of land between the Isthmus of Panama and that of Tehuantepec. This part of the continent is very humid, but most of it is so high as not to have a very hot climate; and on the eastern coast the strong and steady trade winds not only moderate the heat, but render the low and marshy coast remarkably healthful for a tropical region. The West Indies are subject to terrible hurricanes; the interior of North America is often visited by destructive tornadoes.

SOUTH AMERICA has much the same general shape on the map as North America, and the semi-continent has many features in common, as well as certain marked contrasts. The broadest part of

each is towards the north; but the northern portion of North America is a frozen and most repelling region, having its coasts washed by a trackless frozen ocean, filled with barren and ice-crowned islands; while the Caribbean Sea, which lies north of the southern half of the continent, is entirely tropical, and is encircled by a chain of rich and beautiful islands, where frosts are never seen. The climates are therefore reversed. The greater portion of North America has either a cold or a temperate climate; while that part of South America which is of corresponding position and importance has a hot climate. The tropical region of North America is relatively small in area; while in South America it is much the smaller part which has a cold climate. Moreover, the winter cold of Patagonia, Fuegia, and the Falkland Islands is never extreme, like that of so great a part of North America. Even Fuegia, which has a terribly bleak and blustering windy climate, is never very cold. The summers of the extreme south of America are indeed relatively cold, but the winters are correspondingly mild; that is to say, the climate is more steady and less changeable than that of North America. The summers of the Falkland Islands are certainly much cooler than those of London, which has a corresponding north latitude; but the Falkland winter is not much colder than the summer. In short, the climate is chilly rather than cold, and damp rather than wet (for the rainfall, though almost continual, is really small).

The Andes, or South American Cordilleras, have some features in common with the great North American Cordilleras, the Rocky Mountain system. They both extend north and south; both are near the west coast; both are volcanic; and both cut off the rains from a considerable region, rendering the climate locally very dry. But the Andes are much more nearly continuous; they are a much more complete barrier to the traveller and merchant, as well as to the rain-bearing winds of the Atlantic; they have a much greater absolute height, and contain a far greater number of very lofty peaks. Their volcanic activity is also at present much more intense than is seen at any point in North America north of the Tehuantepec Isthmus. The dry or desert region west of the Andes is far more extensive and far more completely arid than the corresponding section of North America. The Andes for a great part of their course, are disposed in two or three somewhat closely parallel chains, running near each other. In Bolivia and Peru they enclose the landlocked plateau of Lake Titicaca. Towards the north, in the United States of Colombia a high and rugged chain runs off to the north-east and east, forming the coast mountains of Colombia and Venezuela. South of the Orinoco and north of the Amazon lies the great quasi-peninsula of Guayana, a mountainous region, only a small part of which is well known to geographers.

The mountains of Brazil have been likened to the Appalachians of North America, which they resemble in having an eastward situation. But, unlike these, they have no marked regularity in course, or similarity of character. The main system seems to separate the Amazon basin from that of the La Plata, sending branches out to the north, so as to separate from each other the various basins of the main Amazonian tributaries. An elongated ring or ellipse of mountains encircles the great valley of the river São Francisco, and another range, the Serra do Mar, runs near the east coast. Farther west is the Serra Mantiqueira, regarded as the main chain of the Brazilian mountains; while the watershed between the north and the south flowing streams is called the Serra dos Ventos. Barely one-fifth of Brazil is truly mountainous. In

point of geologic age, the Brazilian mountains are much older than the Andes. They are largely made up of gneiss and gneissoid rocks. The Guayana mountains much resemble them. To the east of the Andes, and as it were reclining against them, there is an enormous and lofty plateau on which are scattered various extinct or dormant volcanic peaks; but the western slope of the Andes is usually very steep. In some parts of the eastern sub-Andean plain there appear complicated (but generally north and south) ranges of lower mountains, occasionally sending out an arm of hills into the plains of the interior. The really temperate part of South America, including most of Chili, Uruguay, and the Argentine Republic, has a mild, and for the most part singularly equable and agreeable climate; although Northern Chili is a hot and arid desert, and the southern third of that country, including the Chonos Archipelago, is drenched with continual rains. The greater and most characteristic region of South America is the tropical portion. For a tropical country the climate is in general remarkably fine, regular, and healthful. A marked feature is the large and regular rainfall, caused by the Andes, which here stand exactly across the course of the trade-winds. These winds, carried gradually upwards by the shelving plateaus, till they reach the cold Andean summit region, precipitate nearly all their moisture, and leave the narrow strip of land west of the Andes a desert. Towards the north and south, the Pacific slope, being out of the highway of the trade-winds, receives abundant moisture from the Pacific. Owing to the enormous rainfall of tropical South America, it is above all others the land of great rivers. The three great river-systems of the Old-World, the Amazon, and the Plata are all primarily developed upon the eastern terraces of the Andes; but the Plata derives its main water-supply from the Brazilian mountains. Other large rivers are the Magdalena in Colombia, the São Francisco in Brazil, and the Rio Negro in the Argentine Republic. Among the tributary branches of the three great rivers there are many streams which for length and volume take rank with the world's largest rivers. South America has few large lakes, Lake Titicaca being one of the most remarkable; but the slopes of the Southern Andes abound in smaller lakes, doubtless of glacial origin. The Lago or Maracaibo, in Venezuela, is a landlocked and lifeless gulf or arm of the sea.

The interior of South America presents considerable variety. In the central and southern portion of Venezuela we find extensive steppes or prairies, here called llanos; an open region, in part treeless, but in general grassy and devoted to pasturage. To the east and west of these the country is for the most part densely wooded. The vast forest-clad plain of the Amazon is of fluvial origin; and although the river is said to have no true delta, the inland forest through which its waters flow may be said to be of the true delta formation, being everywhere cut by spill-channels and creeks which derive their water from the main river. These channels, together with the Amazonian tributaries, afford in the aggregate a vast, and thus far uncomputed extent of inland navigation. The land portion of this wide region is closely forested and in extent, density, and average height of trees, it is probable that its woodlands have no rivals in any part of the world. In the more central and elevated parts of Brazil, leaving the wooded river-valleys, we find a vast extent of open grassy plains, or campos, crossed with granitic ridges. Towards the southern tropic we encounter a region which, though little developed, appears to be one of the finest and most fertile on the globe.

Farther south the forests begin to disappear, and finally end in the great treeless pampas of the Argentine Republic. It may be remarked that, even in the equatorial region, the high valleys and plains of the Andes enjoy a wonderfully mild and agreeable temperate climate, while the higher mountain-slopes have a perpetual winter. Between the Argentine pampas and the forest region to the north, is the vast wilderness of the Gran Chaco, where strips of forest intervene between grassy plains and dry scrubby ridges. Some of the lower plains are subject to overflow in the rainy season. The Patagonian region south of the pampas consists largely of a succession of terraces rising westward to the Andes, and crossed by many swift and copious rivers. Here are seen vast fields covered with loose stones and shingle, recalling the enormous boulder-covered waste of Labrador. Almost equally remarkable are the 'stone-rivers' of the Falkland Islands—long valleys nearly filled with loose stones. Farther south lies the Fuegian Archipelago, a gloomy and unpleasant region with a bleak climate. Large areas of the islands are densely wooded, and much of the surface is broken and precipitous. Not only is the Andean region in many parts full of active volcanoes, but the country near it is to a singular degree liable to earthquakes, which are of special frequency in Chili, Peru, Ecuador, and Venezuela; and at some points on the Chilean coast the earth is said to be constantly shaken by earth-tremors.

The *mineral wealth* of South America is very great. The gold, silver, copper, mercury, and other valuable metals of Peru have given it a proverbial, though really undeserved, reputation for wealth. The desert country on the Chilean coast is rich in guano, nitre (nitrate of soda), valuable iodine compounds, and borax. The copper and silver of Chili have been a great source of wealth; and the coal of that country, though not of the true carboniferous period, promises to become of very high importance. Bolivia contains the celebrated silver mines of Potosí. Venezuela and Guiana afford considerable supplies of gold; and very rich discoveries of the same metal are reported from Patagonia. Coal occurs in Brazil, and has been noticed at various points even as far south as the Strait of Magellan, on the north shore of which it is mined. Brazil is celebrated for its diamonds.

The *plant-life* of South America is singularly rich and varied. Potatoes, maize, tobacco, pine-apples, vanilla, cacao, and tapioca are all considered to be native American, and probably South American products. Among native medicinal plants are numerous species of trees whose barks yield quinine. Ipecacuanha, coca, copaiba, sa-saparilla, and jaborandi are among the many native drugs. The forests yield india rubber, rosewood, divi-divi, Brazil nuts, and mate or Paraguay tea. Here grow the cow-tree and a large number of species of forest trees affording ornamental and cabinet woods. The plant-life of the tropics is redundant; and the forests are often so dense and so entangled with woody vines as to be impenetrable. In South America the flora is essentially a tropical one, varying much from the Old-World type. There are some plants which are common to North America, but these would seem to have been propagated along the high western sierras. The flora west of the Andes, especially in the far south, is very distinct from that of the main body of the continent, and has quite a number of genera and species in common with Australia, New Zealand, and South Africa, and even with Southern Asia.

The *native animals* of South America are of many species. Except the dog, the llama and alpaca are believed to be the only native species of mammals ever truly domesticated by the American

Indians. Both of these, with the vicuña and guanaco, are of the camel tribe. The llama is used to some extent in Peru as a beast of burden. It also affords wool, but not of so fine quality as that of the alpaca. Among the wild beasts of prey are bears, pumas, jaguars, ocelots, and several kinds of wild-cat. Foxes, skunks, raccoons, otters, the nutria or coypu, and several species of deer are known; as also several remarkable rodents, among them the agouti, the cavies, the capybara, the chinchilla, the viscacha, and some porcupines. The monkeys are of a great many species, all remarkably distinct from those of the Old World. South America is the home of most of the living species of edentates, such as the sloths, armadillos, and true anteaters. Here also are found several species of marsupials. Other animals are the vampire bats, tapirs, peccaries, &c. Among the great serpents are the anaconda and the boa-constrictor. The venomous species include rattle snakes, coral-snakes, and the dreaded bush-master or lachesis. The birds are of extremely numerous species, and many are of wonderful brilliancy. Among them are the condor, the rheu, the toucan, and countless parrots and imitating birds. The fishes and insects are vastly numerous, both in individuals and species. The mammalian remains of the tertiary and quaternary strata of South America are scarcely less interesting than those of North America. The Paleotherium and Anoplotherium; the huge edentate Glyptodon and the ground-sloth (among which is the enormous Megatherium)—these are among the interesting extinct South American mammalian genera, of which as a whole our knowledge is as yet very imperfect.

The *agricultural capabilities* of a large part of South America are unquestionably very great. Stock-breeding is the leading industry on the pampas of the south, and on the llanos and campos of the north. Coffee growing is a prominent pursuit in Brazil. The cereal grains thrive remarkably in the temperate regions. Sugar, tobacco, and cotton are produced in the warmer latitudes. Silver, copper, iodine, nitrates, guano, hay, and provisions are shipped from the west coast. From the La Plata countries wool and various cattle products still take the lead, although flour and grain are becoming important staples of export. Peruvian bark and other medicines, india-rubber, cabinet-woods, chocolate, tobacco, and fruits are shipped from the tropical and forest regions of the north.

The *aboriginal population* of South America is noticed in the article AMERICAN INDIANS. The white population is largely Spanish in language and descent, except in Brazil, where Portuguese is spoken. The common people of Chili are largely of Gallician (Spanish) descent; while Basque blood is said to prevail in Peru. The Brazilian whites are to a considerable extent of Azorean and Madeira stock. There are numbers of German colonists in Brazil, the La Plata countries, and Chili; and also many Italians, Basques, and other Europeans in the Argentine Republic and Uruguay. The English language is spoken in the Falklands and in Guiana; French and Dutch prevail in parts of Guiana. The negro element is strong in Brazil, in parts of Peru, and in Guiana; and there are many persons of mixed descent. It is believed that the total population of South America is about 30,000,000.

A considerable number of the islands usually reckoned as West Indian, and assigned by most geographers to North America, are really continental and South American. Such are the large British colony of Trinidad; the Venezuelan land of Margarita; and the Dutch island of Curaçoa. But the Colombian and English-speaking islands of Old Providence and St. Andrews, though politically South American, are scarcely to be consid-

ered as South American islands. It may further be observed that the West Indian Islands, though from their latitude they are reckoned North American, are throughout marked by a flora which has few distinctly North American features; while their rather meagre indigenous animal-life is, for the most part, very clearly South American in its prominent characters.

A comparative view of the various countries of South America reveals many interesting points of likeness and contrast. The *United States of Colombia*, in the N.W., present an area about twice as large as Austria-Hungary. The coast-region and the large river-valleys have a hot climate, and afford almost every staple product of the inter-tropical zone; but a great part of the country is so elevated that its climate is a perpetual spring, and its products are largely those of temperate regions. *Venezuela*, with vast tracts of unutilised land, presents many of the same conditions as Colombia. Cattle-breeding is here a leading pursuit, and coffee and cacao are among the principal articles of export. Venezuela is larger than France and Germany combined. — *Guiana* (British, Dutch, and French) is a region of dense forests, heavy rains, and intense heat. The seaward and well-settled parts are low and alluvial, but not really very unhealthy, except in the French colony. The area of the three colonies is about that of Prussia and Bavaria combined. — *Ecuador* consists of three distinct districts: the hot Pacific slope, rich in tropical products; a central mountain valley region, with a delicious temperate climate; and the eastern and altogether wild and nearly unpeopled forest region east of the Andes. Ecuador has about the area of Germany. Its present conditions are not favourable to immigration. *Peru*, with a proverbial wealth of mineral resources, and a railway system better developed than that of almost any other South American country, proved only a feeble antagonist in the Chilean war of 1879-81, which deprived the country of some of its most valued resource. For area, Peru may be compared with France, Austria, and Hungary taken together.

The great empire of *Brazil* is larger than European Russia, Germany, Austria-Hungary, and France combined, and its mineral resources are commensurate with its extent; but only a very small portion of these are developed. The mineral wealth of the country is large. Brazil, for many and obvious reasons, is a field more attractive to emigrants of the Latin races than to those of the more northern European nations; yet its southernmost provinces have a fine and temperate climate, and a very fertile soil. The 'River Plate countries' (the Argentine Republic, Paraguay, and Uruguay) have all excellent pastoral and agricultural capabilities. The *Argentine Republic* is making energetic and successful efforts to attract European immigration. The climate is in general admirably adapted to European constitutions, and is one of the most agreeable anywhere known. *Uruguay* is a small but prosperous country, offering much the same attractions as those of the Argentine Republic. The large inland republic of *Bolivia*, now everywhere cut off from the sea, on the whole probably the least developed country in South America. Its surface includes several lofty and arid mountain plateaus, able only in minerals; lower table-lands with a delightful climate, in part fertile, and in part almost a desert; and the still lower tropical and richly fertile Amazonian forest region, with almost entirely unexplored districts of great extent. — *Chili*, on the Pacific coast, is quite cut off by high mountains from easy communication with the interior. The northern part is a desert, invaded only for its mineral wealth; the extreme south has a chilly and

very wet climate; but the main part of the country is extremely fertile, and has a very pleasant and healthful climate. Chili is a prosperous and wealthy country. Some parts present very great attractions to the immigrant.

All the following states of America, except Brazil, are either republics or colonies:

NORTH AMERICA

	Populatio	Capitals.
Greenland (Danish).....	46,740	9,752 Litchfield.
St Pierre, &c. (French).....	81	5,224 St. Pierre.
Domin. of Canada (British).....	3,470,392	1,324,810 Ottawa.
Newfoundland, &c.	40,200	170,500 St. John's.
Bermudas	19	13,948 Hamilton.
British Honduras.....	7,562	27,452 Belize.
United States (including Indians).....	3,602,960	56,500,000 Washington.
Mexico.....	768,490	9,577,279 Mexico.
San Salvador.....	7,725	531,785 San Salvador.
Nicaragua.....	40,200	200,000 Managua.
Honduras.....	40,000	400,000 Comayagua.
Guatemala.....	200,000	1,100,000 Guatemala.
Costa Rica.....	20,000	185,000 San José.
Total.....	8,109,199	67,274,759

WEST INDIAN ISLANDS.

	Area in square miles.	Population.	Capitals.
Jamaica.....	9,500	572,000	Port au Prince.
Dominican Republic.....	17,500	300,000	San Domingo.
Cuba (Spanish).....	17,500	1,100,000	Havana.
Porto Rico	3,720	751,315	San Juan.
Jamaica, British Colony, with Cook's Islands, &c.....	4,193	580,811	Kingston.
Trinidad (British).....	1,751	180,125	Port of Spain.
Bahamas	106	171,869	Bridgetown.
Windward Is. (British).....			
Grenada (and most of the Grenadines).....	175	10,518	Kingston.
St Vincent (and some of the Grenadines).....	114	18,051	Scarborough.
Tobago	27	35,551	Castries.
Leeward Is. (British).....			
Antigua & Barbuda.....	170	15,214	St John's.
Montserrat.....	22	10,083	Plymouth.
St Kitt's (and Anguilla).....	103	25,157	Basseterre.
Nevis.....	20	11,864	Charlestown.
Dominica.....	291	25,211	Roseau.
Part of Virgin Islands.....	57	3,827	Road Town.
Bahamas.....	10	13,521	Nassau.
Cayman Is., &c. (French).....	36	193,883	Georgetown.
Martinique, &c.	51	161,360	St Pierre.
St Bartholomew.....	8	2,801	Gustavia.
Guadeloupe, &c. (Dutch) French Islands.....	62	17,536	Willustadt.
Virgin Islands.....			
St Thomas.....		52,765	Christianstadt.
St Croix.....	21		
Total.....	96,551	4,672,979	

SOUTH AMERICA.

Governments.	Area in square miles.	Population.	Capitals.
Venezuela.....	417,000	2,075,245	Caracas.
Colombia.....	332,000	3,000,000	Bogotá.
Ecuador.....	160,000	1,100,000	Quito.
Peru.....	528,000	5,000,000	Lima.
Bolivia.....	536,000	2,395,000	Cochabamba.
Argentine Republic.....	1,969,000	2,960,000	Buenos Ayres.
Uruguay.....	72,500	458,245	Montevideo.
Paraguay.....	175,000	1,610,000	Asunción.
Chili.....	218,925	500,000	Santiago.
Guiana (British).....	70,000	252,185	Georgetown.
Guiana (Dutch).....	46,000	70,000	Paramaribo.
Guiana (French).....	48,000	26,116	Cayenne.
Brazil.....	3,288,000	11,831,000	Rio de Janeiro.
Falkland Is. (British).....	6,500	1,523	Stanley.
Total.....	7,750,988	31,005,715	
Grand Total of America.....	15,969,738	72,903,063	

The history of America does not begin until 1492, when Christopher Columbus first sighted American land (probably Watling's Island in the Bahamas). We have abundant reason to believe, from the evidence of prehistoric archaeological studies, that men have lived in America from a very remote period. Regarding the earliest colonisation of the continent, we have no evidence at all as to the date, or place, or source of any such movement. It is certain that there were, 500 years before Columbus, Norse colonies, not only in Greenland, but much farther south. But these colonies had perished or been abandoned, and were altogether forgotten in the days of Columbus. As to whether the Chinese records which speak of visits paid by junks to a far-distant eastern land, in reality have any reference to America, opinions may differ. Most of the critics who have thought the matter worth alluding to at all have either ridiculed the idea that the Chinese ever visited America before the time of Columbus, or else have regarded such visits as having no possible value as historical events. But others have pointed out many particulars in which the Peruvian civilisation seems to have resembled that of China, and from these resemblances have inferred that the Peruvians derived their advancement from the Chinese. That the Polynesian race, on the other hand, should have colonised almost every habitable island as far as Easter Island, and never once have crossed the remaining and comparatively narrow strip of sea to Western America, seems very strange; and the fact that wampum, or money made of shells and string together, is current in Micronesia as formerly in North America, appears to have some significance. It is, moreover, well known that under Spanish domination numbers of people of Malay race were settled in and near Acapulco; although this factor now seems to have been entirely absorbed by the older social elements. There is very little doubt (though the fact has been disputed) that America was named in honour of Amerigo Vesputi (Americus Vesputius), a Florentine, who first visited the New World in 1499. It is believed that one Hykcomylus (or Waldseemüller), a German, first named the new land America. At first it was supposed to be a part of Asia; for this reason its native people were, as they still are, called Indians. Many Spanish, Portuguese, French, and English explorers soon pushed across the sea to the newly found world. But except the Spanish and Portuguese (who accidentally discovered Brazil in 1500, and soon colonised it), none of these founded any important American colony for more than a hundred years. In Mexico and Peru (both of them semi-civilised and rich in gold and silver), the Spanish occupation was a military conquest. New England, the oldest British colony, was not permanently settled much before 1610. The Dutch and French had each at one time large colonial interests in Brazil, of which only their Guiana plantations now remain. These, with some islands in the West Indies, are nearly all that is left to those powers of their once splendid possessions in the New World. The French in Canada were dispossessed by the English in 1762, but left their language and traditions there. Louisiana, another great and very costly French colonial experiment, was in 1803 absorbed by the United States. The English colony of Virginia dates from 1607; that of Georgia, the youngest not now under the British flag, was founded in 1733. The Spaniards kept Florida until 1819, when it passed to the United States. The principal English colonies, 13 in number, became the United States of America in 1776. The northern English colonies remained separate

provinces until 1867, when the Dominion of Canada was formed. All the northern provinces have joined the Dominion except Newfoundland, which, with a part of Labrador, still remains a distinct colony. All the magnificent Spanish colonies have been lost to the mother-country, except Cuba and Puerto Rico, with a few dependent islands. Fuller details of history will be found in the articles on the different countries of America.

The following is a tabular statement of some of the leading events, not strictly national or local, which have occurred in American history.

Icelanders settle in Greenland, *circa* 830.
 Markland and Vinland, on the American coast, visited and named by Norse adventurers, 1001.
 The discovery by Columbus, 1492.
 Spanish settlement in Hayti, 1495.
 J. Cabot discovers Newfoundland, and sails south to Florida, 1497.
 Columbus discovers the South American mainland, 1498.
 Cabral in Brazil; discovers the Amazon, 1500.
 Cortez explores the east coast of North America, 1500.
 Pinzon lands at the river Plate, 1508.
 Negro slavery introduced by the Spaniards, 1508.
 Balboa discovers the Pacific Ocean, 1513.
 Cortez conquers Mexico, 1519-21.
 Magellan passes through the straits that bear his name, 1520.
 Pizarro conquers Peru, 1531-32.
 Cartier enters the Gulf of St. Lawrence, 1535.
 Orellana sails down the Amazon, 1541.
 The French colonise Canada, 1542.
 De Soto visits the Mississippi, 1541; dies, 1542.
 Drake visits the north-west coast of North America, 1578.
 John Davis discovers the strait that bears his name, 1587.
 Gosnold explores the New England coast, 1602.
 French settlement of Acadie (Nova Scotia), 1604.
 Jamestown, in Virginia, founded, 1607.
 Quebec founded by the French, 1608.
 New Amsterdam (New York) founded by the Dutch, 1614.
 The Pilgrim Fathers settle at New Plymouth, 1620.
 Negro slavery introduced into Virginia, 1620.
 Puritans found Salem, 1628; Boston, 1630.
 Maryland founded, 1634.
 The French in Gambia, 1635.
 The English conquer Jamaica, 1655.
 The English take possession of New York, 1664.
 Marquette and Joliet descend the Mississippi, 1673.
 Pennsylvania founded, 1682.
 La Salle descends the Mississippi, 1682.
 Scottish-Danish experiment, 1685-99.
 Louisiana settled, 1700.
 Georgia colony settled, 1733.
 British colonists capture Long-bay, 1746.
 Conquest of Canada from the French, 1760.
 War between Britain and the Colonies begins, 1775.
 Independence declared, 1776.
 War ended; independence acknowledged, 1782.
 Haytian revolution begins, 1791.
 Louisiana purchased by the United States, 1803.
 Revolutionary movements begin in Peru, Venezuela, and Ecuador, 1809; in Buenos Ayres, Chili, and Mexico, 1810.
 Florida ceded to the United States, 1819.
 Brazil declared an independent kingdom, 1815; an empire, 1822.
 War of the United States against Great Britain, 1812-15.
 Chili becomes independent, 1818; Mexico, 1821; Guatemala, 1823.
 Spaniards expelled from New Granada, 1826; from Peru, 1826.
 Bolivia founded, 1826.
 Dominican Republic re-established, 1843.
 War between the United States and Mexico, 1846-47.
 First Atlantic telegraph cable laid, 1858.
 Civil war in the United States, 1861-65.
 Slavery finally abolished in the United States, 1865.
 Alaska sold by Russia to the United States, 1867.
 Dominion of Canada formed, 1867.

America, BRITISH, is a name formerly applied to what is now the Dominion of Canada, together with Newfoundland and Labrador. In a wider sense, it includes the Bermudas, the British West Indies (the Bahamas, Jamaica, Trinidad, Barbadoes, the Leeward Islands, the Windward Islands), also the Falkland Islands, and the continental colonies of British Guiana and British Honduras.

America, RUSSIAN, is a name once applied to what is now called Alaska (*q.v.*), including the Aleutian Islands. This whole region was purchased by the United States from the Russian government, in 1867, for \$7,200,000. The Russian occupation lasted over a century, and has left

indelible traces in the country. The Aleuts and a few other natives have been Russianised in religion and manners; along the coast the half-breeds are essentially Russian, and the Russian language has left its impress on all parts of the coast.

America, SPANISH, at present includes only the islands of Cuba and Puerto Rico, with their dependencies. Yet, in a larger sense, the term is often used to designate all those parts of America where the Spanish language is the common speech of the people. In this sense, the term would include the South and Central American republics, Mexico and San Domingo, as well as Cuba and Puerto Rico.

American Blight, the apple-bark plant-louse, or woolly aphid, which forms a cottony film on neglected apple-trees. It is said to have been imported into Britain from America in 1787, but this is doubtful. Cleaning the trees, choking the parasites with anything oily or sticky, treatment with tobacco-water and other washes, are among the suggested remedies. See **APHIDES**; also see *Injurious Insects* (1885), by E. A. Ormerod.

American Indians, the aborigines of America, taken together, form one of the most definitely marked-off and strongly characterised of the different races of men. Their physical and mental characters are much the same from the Arctic Ocean to Fœgia. The Eskimo of the far North alone differs widely in appearance and habits from the so-called 'Red Indian'; but they both agree in having a polysynthetic language. Indeed the real Indian tribes and the Eskimos alike possess languages which, while they may differ greatly in sound and in vocabulary, are almost identical in structure. True polysynthesis consists in the more or less complete amalgamation of the prominent elements of the different words of a sentence, or clause, into one long complex word. Something approaching this process is observable in the language of the Basques in Europe; but with this exception, it is quite unknown in the languages of the eastern hemisphere. The American languages (excepting the Aleut of the North-west, which appears to be North Asiatic) all are marked by this strong family likeness or common feature. Yet some languages are more strongly polysynthetic than others, and one or two (like the Otomi of Mexico) appear to have a minimum of polysynthetism. The unity of the American language type is exactly matched by the essential unity and sameness of the mental, moral, and physical types of the red men. True, some tribes are warlike, and others cowardly; some live by the chase, others by agriculture or horticulture; some are fish-eaters, others hunters; but they are essentially one and the same people throughout, the Eskimos alone excepted.

Their physical characters are a certain tallness and robustness, with an erect posture of the body; a skull narrowing from the eyebrows upward; prominence of the cheek bones; the eyes black, deep set, and having, it is thought, a slight tendency, in many cases, to strabismus; the hair coarse, very black, and perfectly straight; the nose prominent or even aquiline; the complexion usually of a reddish, coppery, or cinnamon colour, but with considerable variations in this respect. They have little or much beard. In physical qualities, the Indians thus make a somewhat close approximation to the Mongolian type. There is also a certain remarkable feebleness of constitution, combined, it may be, with vigour, suppleness, and strength of body. At least, the aboriginal races do not resist well the epidemics introduced by the whites; and many tribes have been exterminated by the effects of the 'firewater' and the vicious

habits brought in by more civilised men. The red man is usually proud and reserved; serious, if not gloomy, in his views of life; comparatively indifferent to wit or pleasantry; vain of personal endowments; brave and fond of war, yet extremely cautious and taking no needless risks; fond of gambling and drinking; seemingly indifferent to pain; kind and hospitable to strangers, yet revengeful and cruel, almost beyond belief, to those who have given offence. The men are usually expert in war and the chase, but inactive in other pursuits. In many tribes, both sexes take part in athletic games. They often excel in horsemanship, and, as a rule, sight and hearing are wonderfully acute.

There is a very prevalent tendency among recent writers to reject the old traditions regarding 'the noble red man of the forest,' and the saying is common in America (quoted, it is said, from a distinguished general in the United States service) that 'the only good Indian is a dead Indian.' We ought to remember, however, that the bad Indian of to-day is in part the creation of the white man, whose vices have degraded him, and whose greed has impoverished him. Even where, from a desire to be just, he has been liberally subsidised, reservation-life, with its consequent idleness and aimlessness, has made the Indian a discontented pauper. The old-time Indian had courage, dignity, self-respect, and hospitality, and not one of these qualities has entirely disappeared from the Indian of the present day. The Araucanians, according to the testimony of their enemies, were 'generous, courageous, humane towards the vanquished, courteous, hospitable, benevolent and grateful.' Seeing the evils of which gold is the cause, they early closed their mines, avowing the most profound contempt for that metal. Eloquence and fondness for oratory, formerly so conspicuous among some of the North American tribes, were equally characteristic of the Araucanian in the far South.

The *property system* of the Indian is essentially communistic. Lands are everywhere, in theory at least, held in common. Still there are rich and poor men among them. Some individuals will be prudent, and others not. Some will build good cabins, and save furs, weapons, corn; while others depend in part upon luck or the charity of their fellows. Notoriously unworthy Indians are sometimes denied the benefit of the savings of their tribe or band. For money, the Indians formerly used strings of *wampum* made of clam-shells. Furs were also current in trade.

The *religion* of the Indians is, in the main, not unlike the Shamanism of North Asia; and the juggleries, incantations, and trances of the *shaman* of Siberia are pretty closely matched by the doings of the North American medicine-man. Most of the tribes acknowledge one Supreme Being, but numerous inferior deities or spirits, good and bad, are usually recognised. Most of the Indians believe in a future life; but their religion is usually without highly spiritual ideas. Circumcision, or something resembling it, once prevailed widely in South America. The sacrifice of human beings was very common in ancient Mexico, when the old religion had many relative features. Cannibalism, a practice which once obtained rather extensively, seems to have had usually a religious significance. Some races, like the Zunis, have an elaborate and highly mystical ritual, to the exhibitions of which none but the initiated are admissible. The ritual of the Roman Catholic Church has strong attractions for the Indian; and the less elaborate service of the Episcopalians has in several instances helped to win over to Christianity tribes which had long rejected the teachings of missionaries of other denominations.

For intellectual pursuits the capacity of the American Indian is fair, but not high, so far as we can judge from the results thus far attained in the training schools established by the United States government. But it must be remembered that these schools have not yet passed the experimental stage. Dr D. G. Brinton of Philadelphia has collected and published several volumes of aboriginal literature, chiefly the production of native Indians, and printed in their own tongues. Among noted American Indians we may enumerate Tecumseh and Pontiac, famous warriors; Logan, celebrated for his valour and eloquence; Brant and Red Jacket, noted leaders of the Iroquois; Osecola, the heroic half-breed chief of the Seminoles; Sequoyah (the half-breed son of a German father), the inventor of the Cherokee syllabary (his name is perpetuated in that of Sequoia, a genus of gigantic Californian trees); Black Hawk, the great warrior of the Sac and Foxes; and Joseph, a noble minded and heroic leader of the Nez Percés. Among the Mexican Indians of distinction have been Benito Juárez (1806-72), once president and twice 'anti-president' of the republic; and Tomas Mejía (died 1867), a valorous general. Rafael Carrera (1814-65), president of Guatemala, was of mixed Indian and negro descent; Jesse Bushyhead (died 1844) was an able Cherokee jurist; Samson Occum (1723-92), an Indian preacher of New England, was the author of some hymns in English, one of which, 'Awaked by Sinai's awful Sound,' is still used in public worship. Complanter (died 1836), an Iroquois chief, is said to have been the earliest temperance lecturer in America. George Copway (born 1820) was well known as a journalist and author. In South America, Copáño (1511-48) was a brave and able warrior of Chili, as also was the giant Colipulle (died 1576). The Araucanian soldier Calafquín (died 1602) is also a great name.

By far the greater part of the native tribes have never progressed beyond the savage state. Yet in Peru, Colombia, Central America, Yucatan, and Mexico, there were tribes five hundred years ago who had attained a relatively high degree of native civilisation. In New Mexico and Arizona, the rather numerous 'pueblos' or native Indian towns are the relics of what may have been a northern extension of the Mexican civilisation. The relics of the prehistoric 'Mound builders' found throughout a large part of Central North America, and the great numbers of the nameless ruined towns of the 'Cliff-dwellers' and other extinct peoples of the South-western United States, would seem to show, however, that in remote ages the native civilisation had a far wider extent than in recent times. The Mexicans and Peruvians excelled in architecture. Neither of them had iron; both had native or other copper and gold, and the Peruvians seem to have had cutting tools of bronze. The Mexicans had no domestic animals but the dog; the Peruvians had also the llama and alpaca.

Both grew cotton as well as maize; both could spin and weave. Yet nowhere have the Indians, except on compulsion, adopted very readily the civilisation of Europe. There has been, however, a considerable progress in this regard among the tribes now placed in the 'Indian Territory' of the United States, where the natives have largely adopted Protestant Christianity and the habits of civilised life. Elsewhere, the Roman Catholics have, in many instances, succeeded better with the Indians than have the Protestant missionaries. In the United States, the Indians have waged many bitter wars against the whites, who have little by little dispossessed them of their lands. Very little trouble of this kind has ever been experienced in Canada, and still less, in recent years, in Spanish America, where the Indian

population would appear to be gaining on the white. The greater spirit and vindictiveness of the northern Indians has involved them in ruin; but the Mexican Indians, contented to belong to a subject race, have multiplied more rapidly than the conquering people. In Mexico, the Indians consider themselves a *gente sin razon*, 'people without reason,' while the Spanish Americans constitute a superior *gente de razon*, or 'people of reason.' Yet in that country the mingling of the two races is very common; and among the best soldiers and statesmen of the republic, some have been Indians of pure blood. In Peru, many of the priests and monks are of Indian race. In Brazil, where the Portuguese language prevails in towns, the speech of the Tupi-Guarani tribes has been adopted as a *lingua geral* (a kind of *lingua franca*) throughout the interior. In Paraguay, the same language has nearly displaced the Spanish, even among the whites. Each one of the countless tribes of America has its own language. These tribes are grouped together by ethnologists, chiefly with reference to the common elements of their languages. In many cases, the various tribes of a group recognise a certain kind of kinship among themselves, but in not a few instances it is very hard to prove any near relationship either by language or by blood; while, in a few cases, tribes speaking the same language differ widely in character, habits, and appearance.

Rejecting the Aleuts and Eskimo from the category of 'Indian' peoples, the principal stocks or recognised families are as follows: (1) The Tinneh or Athabascans, including many tribes of Alaska and Northern Canada, as well as the Apaches, Navajoes, and others in the United States. (2) The Columbian tribes, including the Thlinket of Alaska and many tribes of Western Canada and the NW. of the United States. (3) The Algonquins, a great and pretty clearly marked race, which once covered a large part of the Atlantic slope from Labrador to Virginia, and reached westward to the Rocky Mountains. Here belong the Abenaki, the Delawares, the Crees, the Chippewas, and many now historic tribes. Some authors assign the Cheyennes, the Arapahoes, and even the Blackfeet to this stock. (4) The Iroquois, a once powerful and warlike race, formerly dwelling for the most part in the St Lawrence Valley. This was one of the most clearly defined families of North America. (5) The important Dakota stock, mainly found near the head-waters of the Mississippi. (6) The Appalachians, including the Chakta-Muskoki (or Choctaws and Creeks), the Chickasaws, Seminoles, Cherokees, and others. This family is not a clearly defined group. In point of intelligence and adaptiveness to civilisation, these tribes take a high rank. (7) The Californian tribes; these are very numerous, but lacking in intelligence and spirit. (8) The Shoshones with whom are classed the Utes, the warlike Comanches and Kiowas, the half-civilised Moquis, and many of the degraded Diggers. They live mostly among or near the Rocky Mountains. (9) The Pawnees, with the Arickas, Wichitas, Caddoes, and others. All were 'plainsmen,' and many of them have excelled as horsemen and warriors. (10) The Pueblo Indians and others of New Mexico and Arizona; a composite division. (11) The Mexican tribes, of which the number is very great, and the family unity very questionable. Here are placed the celebrated Aztecs, the half-mythical Toltecs, the interesting and semi-civilised Nahuatlans, and many others. In the languages of this group polysynthesis is said to reach its highest development; yet in the Otomi speech, which is classed

here, an almost monosyllabic simplicity is observable, probably due to a decay of the polysynthetic habit. (12) The Maya stock of Mexico and Central America, some languages of which had a kind of rude alphabetic writing. The Lenca and Isthmian groups are regarded as offshoots of this stock. (13) The Caribs and Orinoco Indians, of many tribes. Here some would place the Chibchas of Colombia, who anciently had a relatively high degree of civilisation. (14) The Amazonian Indians, grouped in a great number of bands or tribes, and having a very low intellectual position. Most of these tribes would appear to have few linguistic or other characters in common. Some regard them as chiefly offshoots of the (15) Tupi-Guarani race, which once covered a large part of Brazil and Paraguay. (16) The Botoendo race, once very powerful in Brazil, now greatly reduced. (17) The Quelma-Aymara group, to which belonged the old Peruvian civilisation (the highest native development). (18) The Motobi of the Gran Chaco, with many subdivisions. (19) The Araucanian-Patagonian stock, and (20) the Fuegians, comprising six or more degraded tribes, which some would assign to group 19, although the Araucanians are physically and morally one of the finest, as the Fuegians are among the lowest, of savage races.

Respecting the future of the American race, it is not easy to make a forecast. It is probably true that in North America, at least, the forcible expatriation and deportation of tribes is a thing of the past. The ordinary operations of missionary work have not thus far, except in a few instances, borne the best fruit among the Indians. The best results have followed where industrial training has been joined to missionary instruction. Even the degraded Fuegians have begun to respond hopefully to this kind of training. The plan adopted years ago, in the United States, of paying annuities to the deported tribes, no doubt took its rise in the desire to deal equitably with them; but the result has been, in many cases, the swift pauperisation and consequent moral degradation of the beneficiary tribes. In Canada the case is different. The French character and methods of dealing always suited the ideas of the aborigines, and the two races amalgamated to a surprising extent under French rule. In later years, the French speaking section of the Canadians seems to have exercised a tacit protectorate over the Indians; at anyrate, during the Indian disturbances of the North-west in 1885, the French element was supposed to be largely in sympathy with the natives. The British and colonial authorities of Canada, however, from the very first have always endeavoured to deal fairly and generously by the Indians, and have made the local French tradition fully their own. Canada never had a real Indian war. Under the Hudson Bay Company's rule in the North-west, no Indian ever had cause to complain of injustice, and, as a consequence, the Indians committed few crimes. Bars and bolts were not needed on any doors. A distinguished English missionary of the Keewatin district has pronounced the natives there the most honest and excellent people in the world, except at the times when whisky has been smuggled into their country.

But it must be remembered that the Indian population of Canada was never nearly so dense as farther south, nor so hard pressed by the influx of white settlers as it has been in the United States from the first. Nothing but the absolute prohibition of immigration could have prevented Indian wars in the United States. The influx of settlers has been incessant; and as a consequence the Indian wars of the country have been almost continually waged, until at last the large

majority of the aborigines of the country have been either extirpated, or conquered and deported, while others have been pauperised and enfeebled by large subsidies. From the outset many public men in the United States have interested themselves in the red man and his fortunes; but legislation has until of late been of little avail; and after all allowances, there is much to regret, and to rouse the feeling of shame, in the history of the relations of the white and red races in North America.

The number of Indians and persons of partial Indian descent in North America is placed at 6,000,000; but this includes a very large number of Spanish-speaking half-breeds and *Mestizos* of Mexico and the Isthmian republics. The Indians of Canada number about 100,000; and those of the United States, including Alaska, about 315,000. There is reason to believe that the Indians of the United States are slowly increasing in number. If this be so, the increase must be due to the cessation of inter-tribal conflicts, and the enforced adoption of regular habits of living, in place of the rude nomadism of former times. In the United States, *non-tribal* Indians are such as have received lands in severalty, and voluntarily pay taxes. They are few in number. The civilised Indians of New Mexico and Arizona are by treaty United States citizens; but they have never desired or received the rights and responsibilities of citizenship. About one-fourth of the United States Indians live in the Indian Territory (q.v.), and the rest mainly on local reservations. There is unquestionably of late a decided improvement going on among many of the Indian tribes.

The South American Indians are estimated by some authorities to number not more than 1,700,000. A more reasonable estimate places the full-blooded Indians of South America at 3,000,000, and the *Mestizos*, or people of half Indian blood, at half as many more. There is, however, very little real knowledge as to the density of the Indian population of the forest regions, some of which are almost unknown to the whites. But, as a rule, the population is very sparse. In Ecuador and Peru many of the Indians are in a state of semi-slavery.

Concerning the relationship of the American race to the Old World peoples, much remains to be learned. The hair, complexion, and features of the Indians are not unlike those of the East Asiatics. In California the natives recognise the Chinese as 'bad Indians'; but the industry, patience, foresight, and thrift of the Chinese are as un-Indian as anything can be, and are no doubt the cause of a great antipathy between the races. Much more respect is due to the opinion which would ascribe a Chinese origin to the civilisation of Peru. The Chinese literature contains various accounts of voyages, which, it would appear, must have extended to the American shores. The Welsh tradition of Madoc (12th century) has led some writers to ascribe a Welsh origin to the Mandans, or even to the Modocs. Some have found Basque names in Newfoundland (a thing not in itself unlikely), and more than one Irish legend speaks of visits made, and even colonies founded, across the sea. Laborious search has been made for supposed linguistic elements common to the Brazilian and West African languages (by S. S. Haldeman and others), but with results mainly negative. There is at present little doubt that man lived in America as long ago as the Glacial Period. If we assume that men first came to America from the Old World by way of lands or island-chains not now existing, we shall do no violence to the possibilities of the case. Whatever accessions may have come in later times, they were probably absorbed and lost in the aboriginal population. If Peruvian or Mexican civilisation was introduced, and not indigenous, it

must probably date from a time when iron was not known to the civilising people. In Spanish America generally, the aborigines are for the most part apparently holding their own against white encroachment, except in countries where immigration is active.

See D. C. Brinton, *The Maya Chronicle* (1882); *The Troquois Book of Edos* (1883); *The Guageence* (1883); *Migration Legend of the Crocks* (1884); *The Lenape and their Legends* (1885); *The Annals of the Cuckewicks* (1885); the voluminous works of H. R. Schoolcraft, which for extent and laborious faithfulness are of great value, although the writer's opinions are to be received with caution; H. H. Baerott, *The Native Races of the Pacific States* (5 vols. 1875); F. S. Drake, *The Indian Tribes of the United States* (2 vols. 1881); the historical works of Francis Parkman; the linguistic writings of Horatio Hale, A. S. Gatschet, and George Gibbs; J. W. Powell, *Introduction to the Study of the Indian Languages* (1880); H. H. Jackson, *A Century of Dishonour*.

Americanisms are words or phrases current in the United States of America, but not in Britain, at least at present. They occur more frequently in speech than in writing; indeed, classical American authors seldom employ any but pure literary English words or constructions, though some of the novelists, of course, admit colloquialisms and local dialect freely into the dialogue portion of their romances or narratives.

Americanisms are of three sorts. The first consists of absolutely new words introduced into the English language in America. This class is comparatively small. Instances are *caneas*, a secret political assembly; *couch*, a prairie cattle-farm; *boss*, a master or employer; *dinner*, a commercial traveller; and *skedaddle*, to run away headlong. The second consists of words or phrases current also in England, but to which a new meaning has been attached beyond the Atlantic. Such are *cheer*, in the sense of amiable or even foolish; *smart* for clever; *store* for shop; *apply* for ill-natured; *saloon* for bar-room; and *crack* for small stream or river. The third consists of obsolete words, or words used in senses once more or less familiar in England, but now discontinued, as *chance* for errand, *sack* for ill, *cunning* for pretty, and *friends* for relations. Professor Schele de Vere, whose work, *The English of the New World* (1873), is the best on the subject, believes, indeed, that the larger number of so-called Americanisms are good old English words, which have become obsolete or provincial in the mother-country. This claim, however, is hardly correct at the present day, owing to the immense number of Americanisms which have recently sprung up in the Far West or elsewhere, and have been too generally adopted through the influence of Bret Harte, Mark Twain, and other popular writers in dialect.

As regards origin, some few Americanisms have been borrowed from the languages of other European nations settled in parts of the United States, as for example, from the Dutch in New York (*chess*, *bafter*), the Spaniards in California (*ranch*, *canyon*), and to a less extent the French in Louisiana (*baggon*, *becc*). A far larger number of words and phrases has been more or less adopted from the German settlers in the western and middle states, and these have largely been popularised by Mr Leland's *Breitmenn Ballads*. But the vast mass of Americanisms are of truly native origin, consisting of flesh or slang usages applied to combinations of existing English words. Some of them are Americanisms only by virtue of the relatively greater frequency with which they are employed. Such are *I guess*, *I reckon*, *I presume*, *I calculate*, originally said to have been Puritan attempts to avoid the possibility of too definite a misstatement. To this class also belong *to fix* as the verb universal (*fix a meeting*—arrange; *fix myself up for dinner*—

dress); *to run*, in the sense of to manage ('run a hotel,' 'run a railway,' 'Who runs this concern?' &c.); *right* in the sense of quite or just ('right comfortable,' 'right here'); and *pretty* used perpetually for 'rather,' as *pretty bad*, *pretty nice*, and even sometimes *pretty ugly*. 'Is that so?' in the sense of 'Indeed!' or 'Really!' and the frequent use of 'sir' and 'ma'am' in addressing equals are also Americanisms. Other phrases more redolent of the soil are 'not a red cent,' 'you bet your bottom dollar,' 'prospecting around,' 'toting a derringer,' and so forth. 'You bet,' as a strong affirmation, recalls the common gambling habits of the west. 'To hand in one's checks,' 'to go one's pile,' 'to hold the right bower,' belong also to the western gaming phraseology. To say that a business speculation 'pans out well' or 'strikes it rich,' is obviously derived from the mining slang of California. *Candy* for every kind of sweetmeat, is common to the entire Union. *Rooster* for cock, *lumber* for timber, *fall* for autumn, *back of* for behind, *lot* for field or paddock, form similar elements of the general language. *Cracker* means biscuit, while *biscuit* is the name of a light roll. Many phrases are evidently due to the direct influence of French ideas, and the love of the travelled American for Paris. *Baggage* for luggage, *calise* for small trunk, *dépot* for railway station, *bureau* for office (and domestically for chest of drawers), *exposition* for exhibition, are cases in point. In many instances, Americanisms proceed from the desire for brevity, as *pants* for trousers (pantaloons), *cars* for railway carriages, and *to wire* for to telegraph, the last now widely naturalised in England. On the other hand, where we say a lift, the Americans say an elevator; and generally speaking, long words of Latin origin, which in England are mostly confined to serious writing, in America form part of the current vocabulary of every-day life. Such are *to operate* for to work, *to locate* for to place; *institution*, *lyceum*, or *academy* for school or college, *recitation* for lesson, *proclivities* for tastes, *section* for district, *eminence* for hill, *residence* for house, *elegant* for pretty, *vacation* for holidays, and *prominent citizens* for well known men.

From a slightly different point of view it may be said that the speech and writing of cultivated Americans are fairly free from noteworthy Americanisms, save those which consist in the excessive use of a Latinised vocabulary, and those which are necessitated by the intercourse of ordinary life, such as *horse-cars* for trams, *side-walk* for pavement, and *railroad* for railway. Whoever wants pop-corn or squash must needs ask for them. But the speech and writing of the uncultivated classes diverge increasingly from the pure literary English standard, and are likely to diverge increasingly in future. New slang arises rapidly, and is widely diffused with extraordinary speed. At one time the cant phrases of the western miners overran the country like wildfire; at present, the dialect of the cowboys who 'paint the town red,' reverberates from state to state of the Union. The language of the rural papers is often almost incomprehensible to an English reader: it abounds in graphic details about the latest *boom*, narrates how the high-toned students at the Eclectic Institute *excursed* in wagons to the annual grove-meet, observes that Chicago *crooks* were shadowed at the theatre, or laments that the elegant paragraph in a contemporary's columns should turn out to be nothing but a fish story. Nevertheless, by slow degrees most of these Americanisms, however odious, are at last imported into Britain itself. *Up-to-date* and *posted-up* are now practically parts of the English language; *exhibition* is rapidly being acclimatised amongst us; *canned music* are almost as well known

in England as tinned peaches; and *mashers* are as familiar in London as in New York or Boston. The tendency to take our slang in particular from American sources is largely on the increase, and has been strengthened partly by the diffusion of works like Mark Twain's and Frank Stockton's, partly by the increased intercourse between the two countries, and partly by the influence of the cosmopolitan Americans who throng the Continent.

In the New England states, the Americanisms in use are chiefly those of the older crop—that is to say, the English words now obsolete or provincial, and the words evolved on the soil for new objects or recent inventions. In the south, among the white population, almost pure English is generally spoken. But in the middle states, and still more in the west, slang is rife, and startling Americanisms form the mass of the colloquial language. All over America, including Canada, the spoken tongue tends to be far less correct than the written. People who write *is not*, say *ain't*; people who write *almost always*, say *most allus*; people who write *very ordinary*, say *pretty or'ery*. In a few cases the American pronunciation is even crystallised in the accepted spelling: thus toffee is always written *tuffy*, and halloo is beginning to be written *hello*. The comic papers go so far as to print *popper* for papa, *jest* for just, and *rather* for rather.

Americanisms in spelling are chiefly due to the influence of Noah Webster's dictionary, which in many cases adopts an orthography not sanctioned by British authorities. Illustrative cases are practiced, offenses, labor, theater, traveler, traveled, mold, and fulfillment.

See *The English Language in America*, in the Cambridge Essays for 1855; Bartlett's *Dictionary of Americanisms* (1858); R. A. Proctor's 'Americanisms' in *Knowledge* for 1886; and Lowell's prefaces to *Biglow Papers*.

Amerigo Vespucci. See VESPUCCI.

Amersfoort, an ancient town of the Netherlands, 14 miles N.E. of Utrecht by rail. It has a large trade in grain; tobacco is grown in the district; and brandy, cotton and woollen goods, leather, soap, and beer are manufactured. Here was born the statesman Oldenbarnevelt. Pop. (1883) 14,182.

Amethyst, a variety of Quartz (q.v.), differing from common quartz and rock crystal chiefly in its beautiful violet-blue or purplish violet colour—well known as *amethystine*—which is owing to the presence of a little peroxide of iron or of manganese. It is one of the most esteemed varieties of quartz, and is much employed for seals, rings, &c., although, being comparatively abundant, it is much inferior in price to the true gems. An amethystine tinge is frequently to be observed in specimens of quartz, which yet are not perfect amethyst. The tinge is often very faint, and is frequently confined to the summits or edges of the crystals. The finest specimens of amethysts are brought from India, Ceylon, and Brazil. It is, however, a common mineral in Europe, and occurs in many parts of Scotland. It frequently occurs lining the interior of balls or geodes of agate, and in veins and cavities in basalt, diabase, and other igneous rocks. The ancients imagined it to possess the property of preventing intoxication, and persons much addicted to drinking therefore wore it on their necks. The name is derived from a Greek word which signifies *unintoxicated*. Not to be confounded with this mineral is that sometimes called the *oriental amethyst*, which is a variety of Spinel (q.v.) having an amethystine colour, and is a very valuable gem. False amethysts made of glass or paste are very common, and in general very coarse, but a very perfect imitation can be and sometimes is made.

Amha'ra ('the high lands'), the middle and largest of the three divisions of Abyssinia, extending from the Tacazzé to the Blue Nile, and embracing the beautiful Lake Tzaua (see ABYSSINIA). Capital, Gondar (q.v.). The *Amharic language* is spoken, with local variations, throughout Abyssinia, and has, except in Tigré, entirely superseded the Ethiopic, or Geez, to which it is related (see ETHIOPIA, SEMITIC LANGUAGES). Like the latter, it is of Semitic origin, but has been largely corrupted with non-Semitic African admixtures.

Amherst, a seaport of Tenasserim, Burmah, on the east shore of the Bay of Bengal, at the mouth of the Salwin, 30 miles S. of Maulmain. It was founded in 1826 as the capital of the newly-ceded province, and was named after the then governor-general of India. Next year, however, the headquarters were transferred to Maulmain; and Amherst now is of no importance. Pop. 3000. The district of Amherst has an area of 15,189 sq. m., and a pop. (1881) of 301,086.

Amherst is the name of a village in Massachusetts, 20 miles N. of Springfield. It is the seat of Amherst College, under Congregationalist management.

Amherst, JEFFREY, Baron Amherst, born at Riverhead, Kent, in 1717, as a boy was a page to the Duke of Dorset, who in 1731 procured him an ensigncy in the guards. In 1758 Pitt gave him the command of the expedition against the French in Canada; and Canada was ours by the autumn of 1760, thanks to his prudence and to Wolfe's enthusiasm. This was the great achievement of his life, though in 1772 he became officiating commander-in-chief, and in 1796 a field-marshal, having been raised to the peerage in 1776. He died at Montreal, his Kentish seat, 3d August 1797. His nephew, WILLIAM PITT AMHERST, Earl Amherst of Arracan, was born in 1773, and succeeded as second baron in 1797. His embassy to China (1816) failed through his manly refusal to 'kowtow' to the emperor; but, in spite of that failure, he received in 1823 the governor-generalship of India. For the successful first Burmese war, and for the capture of Bharrpore, he was rewarded with an earldom in 1826. Two years later he returned to England, and, after nearly thirty years of comparative retirement, died at Knole Park, Kent, 13th March 1857.

Amherstburg, a town of Ontario, Canada, at the head of Lake Erie, 4 miles S. of Detroit. It has a large timber trade. Pop. (1881) 2672.

Amiantus. See ASBESTOS, AMPHIBOLE.

Amice, a flowing cloak formerly worn by priests and pilgrims. Also, a strip of fine linen, with a piece of embroidered cloth sewn upon it, worn upon shoulders by priests of the Roman Catholic Church in *de service* of the Mass. The bands sometimes worn by Protestant clergymen are a relic of this garment.

Amides was the name originally applied to a group of organic compounds, derived from ammonia, NH_3 , or NH_4H , by the exchange of one or more atoms of hydrogen for a corresponding number of atoms of a metal or a compound radical. At present, the term *amide* is restricted to the case in which one or more atoms of hydrogen are replaced by an *acid radical*, and the amides are called primary, secondary, or tertiary, according as one, two, or all three of the atoms of hydrogen are replaced by the acid radical. The primary amides may be obtained in various ways, of which we shall mention two: (1) If we heat an ammoniacal salt, two atoms of water are given off, and the amide corresponding to the acid is left; thus, acetate of ammonia ($\text{NH}_4\text{O}(\text{C}_2\text{H}_3\text{O})$) - water (H_2O) = acetamide ($\text{C}_2\text{H}_5\text{ONH}_2$). (2) If an anhydride is submitted

to the action of ammonia, there are simultaneously formed an amide and an ammoniacal salt. Thus valerianic or valeric anhydride ($\text{C}_7\text{H}_{13}\text{O}_2$) + ammonia (NH_3) = valerate of ammonia ($\text{NH}_4\text{OC}_7\text{H}_{13}\text{O}$) + valeramide ($\text{C}_7\text{H}_{13}\text{ONH}_2$). The amides are, for the most part, capable of being obtained in a crystalline form, and are fusible volatile bodies. If, in place of an *acid radical*, a *base radical* replaces one or more atoms of hydrogen in ammonia, a class of compounds termed *amines* is formed. See ALKALOIDS.

Amidogen, or DIAMIDE, $\text{NH}_2 - \text{NH}_2$, was till lately looked upon as a hypothetical body, to which the formula NH_2 was assigned. Curtius has, however, recently produced the sulphate of amidogen, from which amidogen itself is obtained by the action of an alkali. It is a gas, possessing (when concentrated) a peculiar odour somewhat similar to that of ammonia, and when inhaled it strongly affects the nose and fauces. It possesses an alkaline reaction, and unites with acids to form salts. Research shows that its formula must be $\text{NH}_2 - \text{NH}_2$, and not NH_2 . See ALKALOIDS.

Amiel, HENRI FRÉDÉRIC, was born at Geneva in 1821. After travelling in Italy, he studied at Berlin (1844-48), where he read widely and industriously, and returned to Geneva saturated with German science and philosophy. In 1849 he was appointed professor of *Esthetics* and French Literature at the Academy (University) of Geneva; which post, four years later, he exchanged for the professorship of Moral Philosophy. He died in 1881. His wide culture, critical power, and profound but melancholy speculation, would probably have remained unknown to the outside world, had not a selection been published after his death from his *Journal Intime* (2 vols. 1882-84; Eng. trans. 1885). He also wrote two small volumes of poetry.

Amiens (ancient *Samarobriva*), an old French city, the capital once of Picardy, and now of the



Amiens Cathedral.

department of Somme - on the many-channelled

navigable Somme, 81 miles N. of Paris by rail. Its fortifications have been turned into charming boulevards, but it still retains its old citadel. The cathedral of Notre Dame is a masterpiece of Gothic architecture. Begun in 1220, or a little later than Salisbury cathedral, it is 452 feet long, and has a spire (1529) 426 feet high; but its special feature is the loftiness of the nave, 141 feet. In his little work called *The Bible of Amiens*, Ruskin says this church well deserves the name given it by Viollet-le-Duc, 'the Parthenon of Gothic architecture,' and affirms that its style is 'Gothic pure, authoritative, and unaccused.' Other noteworthy buildings are the Hôtel-de-Ville (1600-1760), in which the Peace of Amiens was signed; the large museum (1864), in Renaissance style; and the public library, which was founded in 1791, and contains 70,000 volumes. Amiens has considerable manufactures of velvet, silk, woollen, and cotton goods, ribbons, and carpets. Peter the Hermit and Duncange were natives, and there are statues to both of them. The 'Mise of Amiens' was the award pronounced by Louis IX. of France, in 1264, on the controversy between Henry III. of England and his people as to the 'Provisions of Oxford.' The 'Peace of Amiens' (March 27, 1802) was a treaty intended to settle the disputed points between England, France, Spain, and Holland. By it, England retained possession of Ceylon and Trinidad, and an open port at the Cape of Good Hope; the republic of the Ionian Islands was recognised; Malta was restored to the Knights of St John; Spain and Holland regained their colonies, with the exception of Trinidad and Ceylon; the French were to quit Rome and Naples; and Turkey was restored to its integrity. In the Franco-German war, on 27th November 1870, General Manteuffel inflicted, near Amiens, a signal defeat on a French army 30,000 strong, and three days later the citadel surrendered. Pop. (1872) 61,063; (1886) 80,288.

Amines. See AMALOIDES.

Amiot. See AMYOT.

Amirante Islands, a group of eleven low, wooded islands lying SW. of the Seychelles, opposite the eastern coast of Africa. Their total area is about 32 sq. m., and the pop. about 100 French-speaking half-breeds. They fell to Great Britain in 1814, and form a dependency of Mauritius.

Amlwch (pron. *er* as *y*), a small seaport of Anglesey, North Wales, on the north coast of the island, 21½ miles NNW. of the Menai Bridge by rail (1867). It is a busy but rather dirty town, deriving its importance almost entirely from the neighbouring rich copper mines of the Parys Mountain. Till 1885 Amlwch united with Beaumaris, &c. in returning one member to parliament. Pop. (1881) 2664.

Ammanat'i, BARTOLOMEO, architect and sculptor, was born at Florence in 1511, and died in 1592. He was a pupil of Bandinelli and Sansovino. Pope Julius III. employed him in the decoration of the Capitol, and Cosmo de' Medici appointed him his architect. His works have all a certain grandeur of character, but are marred by mannerisms.

Ammergau. See OBER AMMERGAU and MYSTERIES.

Ammiānus Marcellinus, a Roman historian, born of Greek parents at Antioch in Syria, about 330. After serving in several campaigns in Gaul, Germany, and the East, he settled at Rome, devoted himself to literature, and was alive as late as 390. He wrote in Latin a history of the Roman empire from 96 to 378 A.D., in 31 books, of which only 18 books are extant, comprising the years 353 to 378. This part of the work, however, is the most

valuable, as it treats of affairs with which the author was contemporary, and is one of the most important sources for the history of the Emperor Julian. The work may be regarded as a continuation of Tacitus, and though the portions remaining have many faults of style, they are valuable on account of the author's careful descriptions of countries and events from personal observation. The best edition is by Gardthausen (1875).

Ammon, a god of the ancient Egyptians, worshipped especially in Thebes (*No-Ammon*), and early represented as a ram with downward branching horns, the symbols of power; as a man with a ram's head; and as a complete man with two high feathers on his head, bearded, sitting on a throne, and holding in his right hand the sceptre of the gods, in his left the handled cross, the symbol of divine life. Ammon, his wife Mut ('the mother'), and his son Chensu, form the divine triad of Thebes; their worship was at its greatest height under the 18th to the 20th dynasty. The name signifies the hidden, unrevealed deity; and in Egyptian mythology he held the highest place. His undefined character may serve to explain how other deities were identified with Ammon. After the 18th dynasty we find in hieroglyphics the name *Amun-Ra* frequently inscribed, indicating a blending of Ammon with the sun-god Ra. Similarly, the representation of Ammon with a raven's head shows the blending of him with Kneph. From about the time of the 21st dynasty, he came to be considered the god of oracles, and as such was worshipped in Ethiopia and in the Libyan Desert. 'Twelve days' journey west of Memphis, in the desert was a green oasis fringed with a belt of palm trees, on which rose the temple of Ammon. Hither came pilgrims laden with costly presents; among them Alexander the Great and Cato of Utica. Alexander was hailed as the actual son of the god by the priests, quick to anticipate the wishes of the hero. The Persian conqueror Cambyses sent against the temple an expedition, which perished miserably in the sands. The worship of Ammon spread at an early period to Greece, and afterwards to Rome, where he was identified with Zeus and Jupiter.

Ammon, CHRISTOPH FRIEDRICH VON, a German theologian, born in 1766, was professor of theology at Erlangen and Göttingen, and court preacher at Dresden, where he died in 1850. He wrote handbooks of biblical theology, church history, and Christian ethics. He may be said to have stood midway between supernaturalism and rationalism.

Ammonia, HARTSHORN, or the VOLATILE ALKALI, was one of the few substances known to the chemistry of the ancients; being named to by Pliny under the name of *cheimical odour*, which he evolved by mixing lime with urinum (probably sal ammoniac). It derives its name ammonia from its being obtained from sal ammoniac, which was first procured by heating camels' dung in Libya, near the temple of Jupiter Ammon. The atmosphere contains a minute quantity of ammonia, amounting to 210 to 247 parts in 10,000,000,000 parts of air, which is equal to 1 volume of ammonia in 28,000,000 of air. It is likewise present in rain-water in variable proportion. The supply of ammonia in the atmosphere is due to its evolution during the putrefaction of animal and vegetable substances, during the vinous fermentation, and the combustion of coal. It is likewise present in respired air, and is therefore a product of the daily wear and tear of the animal system. The principal source of ammonia at the present time is the destructive distillation of coal, as in gas-making. Blast-furnace and paraffin works also produce large quantities. The materials which pass over from the retort are partly uncon-

densable and truly gaseous, and these are carried to our gas-jets, and burned; but in other parts they are condensable, and are received during the purification of the gas, as a mixed tarry and watery liquid. On allowing this liquid to settle, the watery portion, containing ammonia, can be separated, and, hydrochloric acid being added to it, there is formed a compound of ammonia and hydrochloric acid, called chloride of ammonium, which can be obtained dry, by evaporating the solution down in shallow vessels. Pure ammonia is manufactured from this impure chloride of ammonium by mixing it with its own weight of slaked lime in a retort, and applying a gentle heat, when the ammonia as a gas passes over, and is received in a vessel containing water. The solubility of ammonia in water is very great, 1 volume of water at 32° F. (0° C.) dissolving 1050 volumes of ammoniacal gas.

The *liquor ammoniac* of the chemists, or *hartshorn* of the shops, contains about 32 per cent. by weight of the gas, and it is lighter than water, its density being .891. The solution of ammonia is transparent, colourless and strongly alkaline. In taste it is acrid caustic, and in odour very pungent. Applied to the skin in a concentrated form, it blisters. Exposed to the air, the ammonia escapes, and the solution thus gets weaker, and, reduced to -40° F. (-40° C.), it freezes. As generally obtained, even in the gaseous condition, it is in combination with water, and may be represented by the formula NH_4HO or $\text{NH}_3\cdot\text{H}_2\text{O}$. Dry ammonia can be procured by passing the vapour of ammonia, as ordinarily obtained, over fused chloride of calcium, when the water is abstracted, and a true gaseous ammonia is left, having the composition of one atom of nitrogen and three of hydrogen, NH_3 . Gaseous ammonia can be liquefied under pressure and cold, and then yields a colourless, clear, mobile liquid, with the characteristic odour and other properties of ammonia much intensified. Ammonia combines with acids to form a class of salts which are of considerable importance. Thus, the crystallised sulphate of ammonia, $(\text{NH}_4)_2\text{SO}_4$, is very extensively used as a top dressing by farmers, and is also mixed with manures where an increase of ammoniacal matter is desirable. The chloride of ammonium is also employed in agriculture, likewise largely by the Russian peasantry, in place of common salt, as a condiment for flavouring food.

In medicine, the gaseous ammonia has been rarely used. The solution of ammonia is employed as a means of rousing the respiratory and vascular systems; and of the speedy alleviation of spasm. It is also used as a local irritant and antacid. It is serviceable in dyspeptic complaints with preternatural acidity of stomach and flatulence; to produce local irritation or destruction of certain parts, and to render comparatively harmless the bites of poisonous animals, such as serpents and insects.

Ammonium is the term applied to the group of atoms represented by the formula NH_4 . As this group enters into the composition of many salts, exactly in the same way that potassium, sodium, and other metals do, the term *hypothetical metal* has been applied to it, although no one has ever succeeded in isolating it. Ammonium may be prepared by acting on an amalgam of sodium and mercury with a solution of chloride of ammonium. A portion of mercury is slightly heated in a porcelain vessel, and pieces of sodium introduced, when the sodium and mercury combine, and form an amalgam of sodium and mercury, which is a semi-solid substance, and scarcely occupies more space than the bulk of the mercury employed. If this be introduced into a vessel containing a strong or saturated solution of chloride of ammonium, NH_4Cl , the chlorine combine with the sodium, Na, of the amalgam, forming chloride of sodium,

NaCl , and the ammonium unites with the mercury, forming the amalgam of ammonium and mercury. As the change referred to proceeds, the amalgam increases in size many times, and forms a spongy mass of the consistence of butter, which rises through the saline solution and floats on the surface. The amalgam of ammonium and mercury very readily decomposes, and hence the difficulty of determining its exact composition.

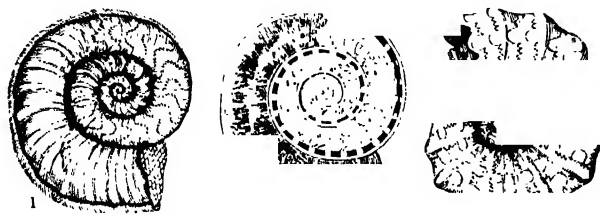
Ammoniacum, or AMMO'NIAC, a gum resin, used in medicine on account of its stimulant and expectorant qualities, is obtained from *Dorema Ammoniacum*, a plant of the natural order Umbellifera, a native of Persia—a perennial about seven feet high, with large doubly pinnate leaves. The leaves are about two feet long. The whole plant is abundantly pervaded by a milky juice, which oozes out upon the slightest puncture, and which hardens, and becomes ammoniacum. The ammoniacum exudes from punctures made by a beetle, which appears in great numbers at the time when the plant has attained perfection. It occurs in commerce either in tears, or in masses formed of them, but mixed with impurities. It is whitish, becoming yellow by exposure to the atmosphere, is softened by the heat of the hand, and has a peculiar heavy unpleasant smell, and a nauseous taste, at first mucilaginous and bitter, afterwards acrid. It is not fusible, but burns with white crepitating flame, little smoke, and strong smell.

Ammoniaphone is the name of an instrument invented by Dr Carter Moffat about 1880, for improving the quality of the singing and speaking voice. Dr Moffat holds that the air of Italy contains peroxide of hydrogen and free ammonia, and that the excellence of Italian vocal organs is largely due thereto. The ammoniaphone is an apparatus for inhaling air saturated with those gases; and in 1884 it was said to be used by 30,000 persons, including many eminent public singers.

Ammonites, a Semitic race of people, living on the edge of the Syrian Desert; according to Gen. xix. 38, the descendants of Lot, and closely akin to the Moabites. They inhabited the country lying to the north of Moab, between the rivers Arnon and Jabbok. Their chief city was Rabbath-Ammon. The Israelites were often at war with them. Jephthah defeated them with great slaughter, and they were also overcome by Saul, David, Uzziah, and Jotham; but after the fall of the Kingdom of Israel (721 B.C.), they spread themselves in the districts east of the Jordan. They sometimes secured the alliance of Syria, of Nebuchadnezzar, and of Arabian tribes, in their wars with the Jews. After the captivity, they endeavoured to hinder the restoration of the Jewish state, but were finally conquered by Judas Maccabæus. Justin Martyr affirms that in his time the Ammonites were still numerous. From the name of their princes, it is evident that their language was closely akin to Hebrew. Their chief deity was Moloch, and under that head their religion is discussed.

Ammonites, a genus of fossil shells, nearly allied to the recent genus *Nautilus*, being, like it, chambered and spiral. The molluscan inhabitant appears to have lodged in the last and largest chamber of the shell, the spaces left behind as it increased in size being successively converted into air-chambers, and all connected by a tube (*siphonule*), so that the animal could at pleasure ascend or descend in the sea; whilst the transverse plates dividing the chambers gave strength to the whole structure without great increase of weight. In the *Nautilus* these dividing plates (*septa*) are simple and curved and their edges (*sutures*) plain; but in the Ammonites the septa are often very

complex, and the sutures zigzagged, foliated, or irregularly lobed. Ammonites have long been popularly called *Cornua Ammonis*, from a fancied resemblance to the horns on the sculptured heads of Jupiter Ammon. In former times they were ignorantly mistaken for petrified snakes; and impositions have been practised on collectors by adding to specimens nicely carved snakes' heads; whilst the general absence of heads was popularly accounted for by a legend of a saint decapitating the snakes, and turning them into stone. The family to which the Ammonites belong (Ammonitidae) ranged from Palaeozoic to Mesozoic times, and embraced a number of different forms. In some the shell is straight (Bacitrites, Baculites); others are bent on themselves (Ptychoceras); some are curved (Toxoceras); then we have an elegant



Ammonites:

1, *Ammonites obtusus*; 2, section of *Ammonites obtusus*, showing the chambers and siphon; 3, *Ammonites nobilis*.

spiral form (Turrilites); besides discoidal and semi-discoidal forms (Criceras, Ancyloceras), and involute types such as Ammonites, Goniatites, Ceratites, &c. The most prominent Palaeozoic representatives of the family are Goniatites and Clymenia. The Ammonites proper are Mesozoic forms, and are characteristic of the Jurassic and Cretaceous systems. In the former system especially, particular species distinguish particular zones, which renders the genus of great interest and importance to the geologist; for some of these zones are persistent over wide regions. The number of species of true Ammonites is very great, several hundred being known. They differ much in size, some being quite minute, while others are as large as cart-wheels.

Ammonium, the site of the famous temple of Ammon in the Libyan Desert, the modern oasis of Siwah. See AMO'S.

Ammonius, surnamed SACAS ('sack-carrier'), a Greek philosopher, founder of the Neo-Platonic School, is said to have been in his earlier days a porter in Alexandria, whence his surname. His parents were Christian, but he himself is said by Plotinus to have abandoned his early religion; although both Eusebius and St Jerome deny his apostasy. He opened a school of philosophy in Alexandria, and sought to harmonise, through a comprehensive eclecticism, the philosophies of Aristotle and Plato. He seems also to have added elements of oriental speculation; but it is doubtful how far Neo-Platonism represents his own position. His most distinguished pupils were Origen and Plotinus. Ammonius Sacas died at Alexandria, 243 A.D., at the age of more than eighty. He left no writings behind him.

AMMONIUS was also the name of a Peripatetic philosopher of the 1st century, the instructor of Plutarch; of a Christian philosopher of the 3d century, who wrote a 'Harmony of the Gospels'; of a philosopher of the 5th century, a disciple of Proclus, who left important commentaries on Aristotle; and of an Alexandrian grammarian of the 4th century.

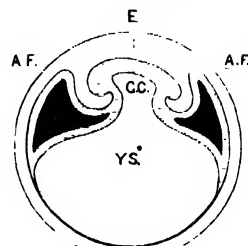
Ammophila. See REED.

Ammunition is a term once used for all military stores only for materials employed in charging firearms—shot, shell, gunpowder, cartridges, fuses, and wads. See the articles under these heads. Ammunition wagons are specially constructed for carrying different kinds of ammunition.

Anne'sia is loss of memory. See MEMORY.

Amnesty (from Greek words for 'not remembered') signifies an act of pardon or oblivion, and the effect of it is, that the crimes and offences against the state, specified in the act, are so obliterated that they can never again be charged against the guilty parties. While pardon exempts individuals from the punishment the law inflicts for their offence, an amnesty is generally granted to a whole class of offenders. The word is also applied to those clauses in a treaty of peace, which confirm what the enemy state has been done with property or debts during the war. The amnesty may be either absolute, or qualified with exceptions. Bonaparte, on his return from Elba in 1815, declared an amnesty, from the benefits of which he excepted thirteen persons whom he named. Upon the restoration of Charles II., the persons actually concerned in his father's execution were, as a class, excluded from the amnesty granted. It is of importance that exceptions should be specific, and not, as in the Bourbon Amnesty of 1816, of a general kind, so as to leave doubt and uncertainty in the public mind. The amnesty to all who were guilty of treason against the United States, or adhered to their enemies during the civil war, included domiciled aliens. But the amnesty proclamation (25th December 1868) did not entitle one whose property had been sold under the Confiscation Act of 1862 to reclaim the proceeds after they had been paid into the treasury of the United States. The French pardoned 2245 Communists by decree in 1879, and granted a general amnesty for political offences in 1880. The pardon granted to deserters, on the occasion of the Queen's jubilee (1887), was virtually an amnesty.

Amnion is a fetal membrane which immediately invests the embryo, appearing very early in the development of the latter, and adhering closely to it. Double folds grow round the embryo, arching over it on all sides, and uniting in a central point. The origin of the anterior and posterior folds is indicated in the diagram (A.F.). The inner layer of this double fold becomes separate from the outer and forms the amnion, while the outer portion, the history of which need not here be noticed, is best known by Turner's designation, as the subzonal membrane. In fishes and amphibians it does not exist, but is found in reptiles, birds, and mammals. As gestation proceeds, this membrane secretes from its inner surface a fluid which distends the amnion, within which the foetus floats suspended by its umbilical cord. That this fluid, the *liquor amnii*, is of fetal origin, is shown by its occurrence in

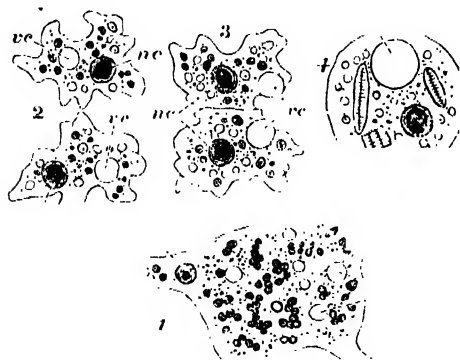


A.F., amnion-fold; E., embryo; C.C., gut cavity; Y.S., yolk-sac. (Ad. v. Weidenstein.)

is of fetal origin, is shown by its occurrence in

birds. It consists of water, containing epithelium, hairs, and $\frac{1}{2}$ to 2 per cent. of fixed solids. In mammals, the fetal urine is added to it during the second half of pregnancy. Its specific gravity varies from 1007 to 1011. The fluid preserves the fetus from injury and pressure, permits of the free movement of its limbs, and prevents them from growing together. When gestation is completed, and labour commences, the amniotic fluid is the chief mechanical agent in dilating the os uteri, and so opening the way for the fetus. For further particulars, see EMBRYO, and for many curious superstitions connected with the subject, see CAUL.

Amœba (Gr., 'change'), a name given to a number of the simplest animals or Protozoa (q.v.), which consist of unit masses of living matter (see CELL, and PROTOPLASM). They are found in fresh water or in mud, and occasionally in damp earth (*A. terricola*). One of the commonest was first described in 1755 by an early microscopist, Rösel von Rosenhof, and the name he gave it—*Proteus animalcule*—still survives in popular language. They are all minute, but some are distinctly visible with the unaided eye. The naked mass of living matter or protoplasm flows out in all directions in blunt processes (*pseudopodia*—'false feet'), and the endlessly varying form has earned for these simple animals their technical and popular names of



Amœba:

1, a with ble-
pharopodia; 2, two daughter
cells; 3, cell with large central
vacuole; 4, cell in cystic
phase, with inclosed diatoms
(flowes.)

1, us, ac; contractile vac-
uoles; 2, two daughter
of dividing; 4, encysted
(Am. Bütschli and G. B.

amoeba and *Proteus animalcule*. Many unit masses or cells of higher animals, e.g. the white corpuscles of the blood, exhibit the same ceaseless change of form, which is generally described as *amoeboid*. The outer layer of the protoplasm is usually firmer than the interior, and in reference to this physical difference the terms *ectoderm* and *endoderm* are often used. The central portion contains the more refractive body or nucleus, which is so characteristic of all cells, and which evidently plays an important part in the life of the animal. More than one nucleus is often present. The amoeba flows along the surface of stone or plant by the slow protrusion of the ever-changing processes. In this way, too, it flows over, and gets outside particles of food, such as diatoms, which are engulfed in the protoplasm, and form with the little bubble of water surrounding them what are known as *food-vacuoles*. The available material, which may be either vegetable or animal, is slowly digested, and the refuse expelled. As the result of internal changes, granules and globules of various kinds appear in the protoplasm. Two pulsating bubbles or *contractile vacuules* are usually to be

seen, which doubtless secure to some extent the aeration and purification of the protoplasm. In unfavourable circumstances, the amoeba can save its life by sweating off a sheath or *cyst*, within which it waits passively for better times. This passage from an active to an encysted phase is exceedingly common among the Protozoa. On attaining its maximum size, the amoeba draws itself out, and breaks into two daughter amoebæ, each of which contains half of the mother nucleus. In a closely allied giant amoeba, *Pelomyxa*, a number of spore-like young are formed within the parent, and in other cases some of the processes are nipped off as buds. Two amoebæ sometimes flow together and fuse in a manner which may be fairly regarded as an incipient form of sexual union (see CONJUGATION, SEX). This simple organism thus exhibits within small compass all the usual animal functions. It is contractile, irritable, and automatic; it feeds, assimilates, secretes, grows, and reproduces; and the intimate changes within the unit mass of protoplasm, in which there is no division of labour, must therefore be exceedingly complex (see PHYSIOLOGY, PROTOPLASM). There are several species of amoeba and numerous related forms, which differ in the formation of an external shell, and in similar unessential characters. All amoeboid forms with blunt processes are ranked together in the sub-class Lobozoa, and are often included under the more general title of Rhizopoda, which comprises all the Protozoa that are predominantly amoeboid. *A. villosa* has a rough tuft at one end; *Lithamoeba* is large and disk-shaped; *Pelomyxa* may attain a diameter of one sixteenth of an inch, and a number may be artificially united into a much larger mass; *Arcella* has a somewhat horny shell, and the power of floating itself by means of secreted gas bubbles, as has been also observed in an amoeba; *Difflugia* has a membranous shell stuck over with sand grains and other foreign particles. Amoebæ are to be found by allowing mud and debris from ponds to settle, and then examining patiently under the microscope. See Leidy, *Fresh-water Rhizopods of North America* (1879), Brann's *Protozoa*, and Bütschli's *Protozoa in Brann's Thierreich*.

Amœbean Verses are such as answer one another alternately, as in some of Virgil's eclogues.

Amol, a town of Persia, 76 miles N.E. of Teheran, on the Heraz, a river which flows into the Caspian. It has good bazaars, and is a place of considerable prosperity and wealth. Its pop. is about 10,000, but is much smaller in summer.

Amomum, a genus of Zingiberaceæ, to which belong the plants yielding Cardamoms (q.v.) and Grains of Paradise (q.v.).

Amoor. See AMUR.

Amorites, a powerful tribe of Canaanites, who inhabited the country north-east of the Jordan, as far as Mount Hermon. In the 13th century B.C. they defeated the Moabites, crossed the Jordan, overpowered the Hittites, and overran Canaan to the sea; but their power was broken by the great victory of the Hebrews under Joshua at Gibeon. Their two most famous kings were Sihon, king of Heshbon, and Og, king of Bashan, the last said to have been of gigantic size. The victory of Joshua did not wholly exterminate the Amorites in Canaan. The residue of this people became tributary under Solomon. Recent investigations seem to prove that they were a race akin to the Hittites.

Amoro'so, in Music, affectionately, tenderly.

Amor'pha. See INDIGO.

Amorphophallus. See ARUM.

Amorphous (Gr., *a*, 'not,' *morphê*, 'form'), shapeless. In Chemistry, the term amorphous is

used to describe the uncrystallised, in opposition to the crystallised, condition of bodies. There are substances which, in certain conditions, are capable of crystallisation, but in other conditions remain amorphous. Thus, pure sugar contains carbon, which appears as an amorphous substance after the sugar has been burned in a platina crucible. The same substance, carbon, appears in its crystallised form in the diamond.

Amory, THOMAS, an eccentric author of Irish descent, who was born about 1691 and died in 1788. His father was Councillor Amory, who went with William III. to Ireland, and was made secretary of the forfeited estates. Amory speaks of having lived in Dublin, where he knew Swift, whose sermon on the Trinity he calls in a public letter to Lord Orrery a 'senseless and despicable performance.' He was living in Westminster about 1757, with a country retreat at Hounslow. Amory lived a retired and meditative life, seldom going abroad save after dark. His *John Bunce* is a curious medley of religious and sentimental rhapsodies, descriptions of scenery, and fragments of autobiography. Latterly, his intellect is believed to have been disordered. Amory's chief works are: *Lives of Several Ladies of Great Britain: A History of Antiquities, Productions of Nature, &c.* (1755); and the *Life of John Bunce* (1756-66).

Amos, one of the so-called minor prophets of the Hebrews, was a herdsman of Tekoa, in the neighbourhood of Bethlehem, and also a dresser of sycamore trees. During the reigns of Uzziah in Judah, and Jeroboam II. in Israel (about 800 B.C.), he came forward to denounce the idolatry then prevalent. His prophetic writings contain, in the first six chapters, denunciations of the Divine displeasure against several states, particularly that of Israel, on account of the worship of idols. The three remaining chapters contain his symbolical visions or the apprehending overthrow of the kingdom of Israel, and lastly, a promise of restoration. His style, remarkable for its clearness and picturesque vigour, abounds with images taken from rural and pastoral life.

Amoy, a seaport town of China, in a small island of the same name, in the province of Fokien, 325 miles E.N.E. of Canton direct. It is the third in importance of the twenty-two treaty ports, and has been celebrated as a trading town for some centuries. It was one of the earliest seats of European commerce in China, the Portuguese having had establishments here in the 16th, and the Dutch in the 17th centuries. In 1841 it was taken by the British, and, by the treaty of Nankin, a British consul and British subjects were permitted to reside there. The trade is now open to all nations; and there are some forty foreign firms. The imports are opium, rice, cotton-twist, British long-cloths, beans, peas, umbrellas, clocks, &c.; the exports are tea, sugar, paper, opium, grass-cloths, gold-leaf, &c. The value of the imports in 1885 was £3,409,350, of which £1,093,161 was under the head of opium; the exports were £1,189,264. The tea exported at the same date to foreign countries and Chinese ports amounted to 23,265,929 lb. Pop. estimated (1881) at 95,600, of whom 239 were foreigners. The island of Amoy, measuring 9 by 7 miles, has 400,000 inhabitants.

Ampelopsis, a genus of the Vitaceæ, closely resembling the vine. The *A. hederaea* is the Virginian Creeper.

Ampère, ANDRÉ MARIE, a distinguished mathematician and physicist, was born at Lyons in 1775. The guillotining of his father in 1793 made a deep and melancholic impression on young Ampère, who sought for solace in the study of nature and

antiquity. In 1805, after he had been engaged for four years as a lecturer at Bourg and Lyons, he was called to Paris, where he distinguished himself as an able teacher in the Polytechnic School, having already begun his career as an author by his *Considérations sur la Théorie Mathématique du Jeu* (1802). In 1814 he became a member of the Academy of Sciences; in 1824, professor of Experimental Physics in the Collège de France. He died at Marseilles, June 10, 1836. Scientific progress is largely indebted to Ampère, especially for his electro-dynamic theory and his original views of the identity of electricity and magnetism, as given in his *Recueil d'Observations Electro-dynamiques* (1822), and his *Théorie des Phénomènes Electro-dynamiques* (1830). These researches prepared the way for Faraday's experiments. See his *Journal et Correspondance, 1793-1805* (7th ed. 1877); *André Marie Ampère et Jean Jacques Ampère; Correspondance et Souvenirs* (2 vols. 1875); and St Hilaire's *Philosophie des Deux Ampères* (1866).

Ampère, JEAN JACQUES ANTOINE, son of the preceding, was born at Lyons, August 12, 1800. After laying the groundwork of his comprehensive studies in Paris, he proceeded to Italy, Germany, and Scandinavia. After his return, he lectured on the history of literature at Marseilles; but, after the July revolution (1830), succeeded Andrieux as professor in the Collège de France. He was elected to the Academy in 1847; and died March 27, 1864. Ampère was deeply read in German literature; his learning was marvellously wide, and his valuable writings upon China, Persia, India, Egypt, Nubia, and his Levantine voyages, proved that the far East itself was embraced within the circle of his studies. Many of his magazine articles have been collected under the title *Littérature et Voyages* (1833). His chief works are: *Histoire Littéraire de la France au XI^e Siècle* (1810); *Histoire de la Littérature Française au Moyen Âge* (1841); *Histoire de la Formation de la Langue Française* (1841); *La Grèce, Rome et Dante* (1848); and *La Science et les Lettres en Orient* (1865). Deep research and judicious criticism, expressed in a clear and classical style, distinguish his various compositions.

Amphibia (Gr., 'double-litied, i.e. living on both land and water), a class of Vertebrates between fishes and reptiles. The term was used by Linnæus to include reptiles, amphibians, and some fishes, and by Cuvier as synonymous with the term 'reptiles,' which he applied to all animals between fishes and birds. The content of the term was soon narrowed, and the amphibia were separated on the one hand from the reptiles which never breathe by gills, and on the other from the fishes which, with the exception of the Dipnoi, never breathe by lungs. And since the amphibia are more nearly related to fishes than to reptiles, Huxley united them in 1863 with the former in the general division of Ichthyoids, afterwards changed to *Ichthyopsida*, while reptiles and birds were included under the contrasted title of Sauroids or *Sauropsida*.

General Characters. The amphibia, such as the common newts and frogs, are readily distinguished from higher vertebrates by the gills borne by the embryo, and sometimes persisting throughout life, by the absence of an Anus (q.v.), and of an Allantois (q.v.) save in so far as this is represented by the urinary bladder, by the two Condyles (q.v.) of the skull, and by other peculiarities in the skeleton. On the other hand, they closely approach the double-breathing fishes (see DIPNOI), and are strictly distinguishable from the fish class only in the absence of fin rays, and in the general possession of fingered limbs like those of higher animals.

Divisions of the Class.—The amphibia include four orders, three of which are represented by the newt, the frog, and the vermiform *Cecilia*; while the fourth includes the Labyrinthodonts (q.v.), now wholly extinct. (1) Forms like the newt and salamander, with long smooth bodies and persisting tails, are termed *Urodela* (Gr., 'tail distinct'). They always have one or two pairs of limbs, and the bones of the forearm and of the lower leg are not fused as they are in the frog. The lower jaw is toothed, and, with one exception, the larvae never have a horny beak. The young form has external gills, and these disappear more or less completely. In one section (Percnibranchiate), the gills persist throughout life—e.g. in *Proteus* and *Mesobranchius*; in a higher division (Caudibranchiate), the gills disappear but the clefts remain—e.g. in *Amphiuma* and *Menopoma*; while in the highest set the gills are lost and the clefts closed—e.g. in *Salamandra* and *Triton*. Besides the types just mentioned, *Siren*, *Proteus*, and *Axolotl* (q.v.) may be noted. They are distributed throughout the temperate northern countries, but their headquarters are in North America. The British species are *Triton cristatus*, *T. cristatus*, *Lissotriton punctatus*, and *L. palmipes*. Fossil *Urodela* occur in the miocene deposits. One large form is of historic interest, because its remains, discovered by Schuchzer in the beginning of the 18th century, were mistaken for the remains of man, and enthusiastically adduced by their discoverer as a proof of the deluge. He christened it *Homo diluvii testis*, but Cuvier detected its amphibian character, and recorded the fancy and name of the discoverer in the title *Andrias schuchzeri*. (2) Forms like the frog and toad, with short, broad, naked bodies, and without tails in adult life, are included in the order *Anura* (Gr., 'without tail'). There are never more than nine distinct vertebrae, the lower jaw is almost always toothless, and there are always two pairs of limbs in which the bones of the forearm and of lower leg fuse at an early stage. Two bones of the ankle are unusually elongated, and the hand, which in the newt order has never more than four fingers, has here a rudiment of a fifth. The tadpole larvae have first external, and then internal gills, which in the adult forms are wholly replaced by lungs. The common frog (*Rana*), the Surinam toad (*Pipa*), the common toad (*Bufo*), and the tree-frog (*Hyla*), are familiar representatives of *Anura*. They are roughly divided into forms with or without tongues. They are of world-wide distribution, though absent, like other amphibians, from all oceanic islands except New Zealand, New Caledonia, and two or three others. The British forms are *Rana temporaria*, *Bufo vulgaris*, and *B. calamita*. *Rana* and *Bufo*, which occur everywhere else, are absent in the Australian region, which is, however, rich in tree frogs. Both adult and tadpole *Anura* have been found in the miocene deposits of France and Germany. (3) The third order of amphibia includes the few snake-like, limbless forms technically known as *Gymnophiona*. The skin is usually provided with cross rows of imbedded scales, the vertebrae are very numerous, the lower jaw is toothed. The newly-born *Cecilia* has external bladder-like gills, but these are immediately lost. The small but well-developed eyes are covered with skin, in adaptation to the subterranean life of these animals. They must not be confused with the blind or slow worms, which are lizards. The four known genera are *Cecilia*, *Epicrion*, *Siphonops*, and *Rhinatrema*. The latter two, and most of the *Ceciliae*, are confined to the warm parts of the American continent south of Mexico; the other *Ceciliae* are East Indian; and *Epicrion* occurs in Java and Ceylon. Some fossil amphibians have a

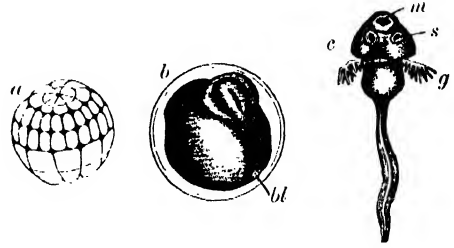
striking resemblance to these *Gymnophiona*. (4) The numerous extinct Labyrinthodonts (q.v.) of the Trias, Permian, and Carboniferous periods, mostly resembled the *Urodela* in form, but some were snake-like. They were well provided with skin armour on the breast and ventral surface, and sometimes attained a large crocodile-like size. The name refers to the complex pattern of the teeth. Compared with these, the modern amphibia are a diminutive race, though a length of two feet has been recorded in one or two cases.

General Structure.—The skin is smooth and viscid, except in the scaled *Ceciliae*. Some of the blood is distributed in the skin, which thus discharges an important respiratory function. An *Axolotl* can, in fact, live after both lungs and gills have been removed, and many amphibians can survive in very unfavourable conditions. There are numerous glands in the skin, and the secreted fluid is irritating and poisonous. The inner skin contains colour-cells, by the contraction or expansion of which the animal may in some cases (e.g. frog) very considerably change its colour. The influence of surrounding colour affects the eye, then the sympathetic nervous system, then the peripheral nerves, and through them the colour cells (see CHROMATOPHORES). The outer skin is continually being renewed, and is sometimes shed in large patches. Certain changes in the skin are not unfrequently associated with sexual maturity. The skeleton consists of backbone, skull, limb-girdles, limbs, breastbone, &c., and is generally comparable to that of higher animals, while its peculiarities would involve more details than are possible within the limits of this article. The Nervous System (q.v.) is represented as usual by brain and brain nerves, by spinal cord and spinal nerves, by a chain of sympathetic ganglia lying beside the backbone on each side, by the usual three sense-organs, and by sensory cells. The small brain is remarkable for the reduction of the hind portion, or cerebellum, to a mere band. In the cave-inhabiting *Proteus*, and in the subterranean *Gymnophiona*, the eye is covered over by the skin. In the higher *Anura*, the ear is provided with a complete Tympanum (q.v.), with Eustachian tubes (q.v.), and a cochlea or rod between the external drum behind the eye and the internal ear. In regard to the alimentary system, teeth and tongue vary greatly in form and occurrence, and are sometimes altogether absent; in most *Anura*, the insect-catching tongue is fixed in front and free behind; in the males of the same order, the lining of the mouth is often pushed outwards into a pair of resonating sacs. The nature of the gut is quite normal. The adult heart consists of a muscular ventricle and two auricles; but during the gill-breathing stage, the circulation resembles that of fishes, and there is only one auricle. The changes associated with the appearance of lungs are exactly comparable to those observed in the double-breathing fishes. The Lymphatic System (q.v.) is well developed. The temperature of the blood is low, and little above that of the water with which the majority are surrounded. The lungs are two comparatively small sacs, on the walls of which the capillaries are spread out. The air, which is pumped in through the nostrils by the dilatation of the mouth-cavity, and prevented by valves from going out again, passes through the glottis on the floor of the pharynx into the larynx, and thence to the lungs. In the *Anura*, the larynx forms a powerful croaking organ. In the *Urodela*, with both gills and lungs, the latter may predominate if the conditions demand aerial respiration, as has been experimentally proved in the case of *Proteus*. The metamorphosis of *Axolotls* (q.v.) is especially instructive in this connection. The paired kidneys and

reproductive organs hardly demand special notice. The males and females often differ in size and colour. The males may be distinguished in some cases by their vocal sacs, swollen thumbs, and skin frills. The Axolotl and *Triton alpestris* become sexually mature in the prolonged larval stage.

Habit of Life. The majority of amphibia are much more at home in water than on land, though in some cases the adaptation to terrestrial life is very complete, and has even modified the ordinary course of development. For while the larval form which escapes from the egg is usually aquatic and gill-breathing, in *Salamandrina atra* of the Alps two fertilised eggs develop within the body of the mother, nourish themselves on the remaining unfertilised ova, and in the absence of damp surroundings, are born as air-breathing forms. If they are prematurely removed from the body of the mother and put into water, they develop a fresh set of gills, and are normal tadpoles. *S. maculosa* is also viviparous, and the young remain a whole year within the mother, but are born with external gills. In the tree-frog, *Hylodes*, which is found in certain volcanic islands, where the porous soil involves the absence of water-pools, the whole development, except the loss of the tail, is completed within the egg, and the young escape as air-breathing forms. It has been suggested that in the embryo, the broad tail must do most of the respiratory interchange of gases, for there appears to be an entire absence of gills. In this and in certain other features there is an approach to reptile development. Even among exclusively lung-breathing forms, the majority prefer to remain in the vicinity of water. Many live alone, and only assemble in crowds for the satisfaction of reproductive impulses. Both in their love and hunger they are especially active in the twilight. The food of the adults consists mostly of insects, slugs, and worms, but the larval forms are mainly vegetarian, 'though not despising animal food, even in the shape of the weaker members of its own family.' Their life is generally at a comparatively low potential, and they save themselves from cold of winter or heat of the dry season by falling into a lethargic state. They are able to remain without food for long periods, and though the tales of toads within stones are to a large extent doubtless mythical, and the results of careless observation, there are some authentic instances of considerably prolonged imprisonment, both in nature and by experiment. Amphibia have considerable power of regenerating lost parts. Some habits connected

of the female, form small pits in the soft skin, and in each of these cradles a young form is developed. In another case (*Nototrema marsupiatum*), there is a large pocket on the back of the female for similar purposes; while in *Rhinoderma darwini*, the male carries the young in a large laryngeal pouch about its throat. The male obstetric frog (*Alytes obstetricans*) winds the eggs



a, segmented ovum of frog, stage with sixty-four cells (from Balfour, after Ecker); *b*, embryo within membrane; *bl*, the blastophore or gastrula mouth (from Balfour, after Reunak); *c*, tadpole with external gills; *g*, ventral view; *m*, mouth; *s*, ventral suckers.

round his thighs, buries himself in damp earth till the young are almost ready to be liberated, and then plunges into a pool, where he is soon freed from his living burden.

Development. The life-history of a form like the frog is of considerable interest as an abbreviated recapitulation of the history of the race, and may be briefly noted. As in many other amphibia, the upper pole of the egg is covered with a



Tadpole of Frog:

1, recently hatched tadpoles about natural size; 2, with external gills; 2a, same enlarged; 3 and 4, inclosure of gills; 5, hind limbs visible; 6, after skin-casting, both pairs of legs visible; 7, atrophy of tail; 8, young frog. (From Mivart.)



The Surinam Toad (*Pipa americana*)

with the eggs of the young deserve notice. Thus in the Surinam Toad (*Pipa americana*), the fertilised eggs, placed on the back

black pigment. In the Anura, the eggs are fertilised by the male as they leave the oviduct; while in others, such as salamanders, the fertilisation is internal. They are laid in gelatinous masses in water. A number of interesting exceptions to the normal mode of egg-laying have been already noticed. The total but unequal division of the ovum, and the subsequent changes by which backbone, spinal cord, gut, &c. appear, cannot be discussed here (see EMBRYOLOGY). When the tadpole is hatched, it is at first inclosed in the gelatinous debris of the egg. It grows for a

short while longer at the expense of the yolk, which in a few forms is seen as a distinct external sac. Soon, however, the tadpole acquires a mouth and arms, and begins to feed. There are a pair of sucking discs behind the mouth. Shortly after hatching, the external gills are covered over by a fold of skin, leaving a posterior aperture for the exit of the water which enters by the mouth. The gills rapidly disappear, only, however, to be replaced by a fresh internal set. The month is armed with horny beak and teeth, and is not unlike that of the lamprey. The whole larva is in a decidedly fish-like stage. As the tadpole grows, the suckers behind the mouth disappear, the gut becomes much longer, and the lungs appear as outgrowths from the œsophagus. The metamorphosis into the adult form now slowly begins. The limbs appear as minute buds, but the front pair become free first. A skin-casting occurs, during which the gills, the beak, and the suckorial form of the month wholly disappear, while the eyes are uncovered, and the circulation becomes modified in association with the increasing importance of the lungs. The tail is absorbed, the gut is shortened, and the mainly vegetarian tadpole gradually assumes all the characters of the carnivorous frog.

The article *Amphibia* in the *Encyclopædia Britannica*, by Professor Huxley, and Professor St George Mivart's book on *The Frog* (Nature Series, London), may be profitably consulted for further details.

Amphibole, the name of a group of minerals which are essentially silicates of lime and magnesia; but these bases are often partly replaced by alumina, and oxides of iron and manganese. The most important minerals in this group are Tremolite, Actinolite, Nephrite (Jade), and Hornblende. Asbestos and its varieties are forms of Tremolite and Actinolite. Many of these occur as fine hair-like filaments, readily separable from each other (*mountain-flax*); in other cases the filaments or fibres are more or less firmly interwoven, giving rise to products which closely resemble the substances after which they are named mountain-flax, mountain-her, mountain-cork.

Amphictyonic Council, a celebrated council of the states of ancient Greece. An *amphictyony* meant originally an association of several tribes for the purpose of protecting some temple common to them all, and for maintaining worship within it, and it was only later that it acquired also a political importance. Its members were called *amphictyons* ('the dwellers around'). Such associations existed at Argos, Delos, and elsewhere, but the most important was that at Anthela, near Thermopylae, the seat of which was transferred later to Delphi through Dorian influence. The members of this league were twelve in number, and were, according to Æschines: the Thessalians, Boeotians, Dorians, Ionians, Peræthians, Magnesians, Locrians, Cæcæans, Phthioti, Mallians, and Phocians, and the Dolopians who are mentioned in other accounts. The members of this confederation bound themselves by an oath not to destroy any city of the Amphictyons, nor cut off their streams in war or peace, and to employ all their power in punishing those who did so, or those who pillaged the property of the god, or injured his temple at Delphi. So excellent an oath was very indifferently kept. In the primitive period of Greek history, it had a beneficial and civilising influence; but its more important interferences in the affairs of Greece were directly contrary to the spirit of its institution. The first of these was the so-called *sacred war*, waged from 595 to 585 B.C., against the Phocian city of Crissa. The second *sacred war*,

from 355 to 346 B.C., gave occasion to the fatal interference of Philip of Macedon in the affairs of Greece (see PHILIP); and a third *sacred war*, instigated by Philip, was but the prelude to the victory of Charonæa, so fatal to Greek liberty.

Amphion, son of Zeus and Antiope, brought up with his twin-brother Zethus on Mount Cithæron, where he practised singing to the lyre. When the brothers grew up and discovered their descent, they marched against Thebes, and put to death its king Lycus and his wife Dirce for having treated their mother with cruelty. They then fortified Thebes by a wall, to make which the stones moved of their own accord to the music of Amphion's lyre. He married Niobe, and killed himself from grief when all his children were destroyed by Apollo.

Amphioxus, or LANCELET, one of the lowest backboneed animals, abundantly distributed on the sandy coasts of warm and temperate seas. It was regarded as a Gasteropod by Pallas, who first observed it; but in 1831 Yarrell remarked the presence of a cellular rod representing a rudimentary backbone. Since then, the structure and development of amphioxus have been thoroughly studied, and its importance as a persisting primitive vertebrate has been universally recognised. It can hardly be called a fish, for there is a greater difference in structure between it and any fish, than there is between a mammal and a bird. The compressed body, which rarely measures more than two inches in length, is pointed at both ends, whence the name amphioxus (Gr. *amphi*, 'both,' and *oxus*, 'sharp'). The mouth is fringed with a circle of fine processes borne on a cartilaginous ring, and the back exhibits a very delicate fin,



Amphioxus (from Haeckel).

which is continued uninterrupted into the tail, and thence for a short distance along the ventral surface. The body is scaleless, and tolerably transparent, and the transverse muscle-segments are beautifully seen. There is no bony skeleton, but the backbone is represented by a simple bony rod (notochord) running from tip to tip, and bearing dorsal cartilaginous rods which suggest vertebral spines. There is no hint of skull or limbs, and apart from the notochord, the skeleton is represented solely by a development of cartilaginous rods about the mouth, and on the walls of the pharynx. The spinal cord, which lies as usual above the rudimentary 'backbone,' has a slight anterior swelling, faintly suggesting a brain, and in this a pigmented spot, probably representing the

which forms a respiratory pigment, as in that of Ascidians. The wall is ciliated and pierced by a hundred or more slits, through which the water taken in by the mouth passes to the exterior, bathing in its course a set of blood-vessels spread out between the slits. In the embryo, these clefts open directly to the exterior, but are afterwards covered by two lateral folds of skin which unite to form an outer chamber (atrial chamber), with a single posterior aperture (the abdominal pore). The heart is a simple tube, in fact, only the largest of many contractile regions on the principal vessels. The blood is colourless.

The sexes are separate, and the reproductive organs form a row of cell-clumps on the wall of the body-cavity. These open separately into the outer chamber above mentioned, and thence the elements find their way out by the abdominal pore. The development very closely resembles that of the Ascidians (q.v.), which are also survivors of the ancestral vertebrates. Several varieties of *A. lanceolatus* have been described, and another genus (*Epigonichthys*) was found on the Australian coast by the Gazelle expedition. The old name of amphioxus was *Brachiostomum*, and the titles *Leptocardia* and *Aceronia* have been applied to the order, in reference respectively to the simple tubular heart and absent skull.

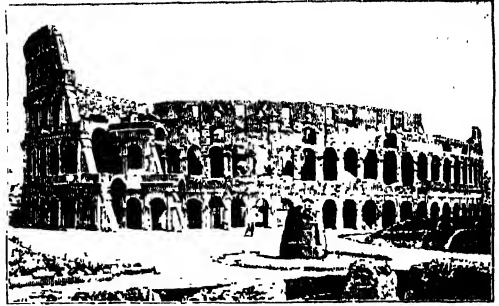
Amphipods, an order of small sessile-eyed crustaceans, with laterally compressed bodies, and long abdomen with three pairs of swimming appendages in front, and behind these three backward turned springing feet. The thoracic or anterior legs bear the gills. The order includes a great number of common forms—e.g. the familiar Sand-hopper, q.v. (*Palitrus saltator*); another very frequent genus, *Orchestia*, sometimes much more terrestrial than the former; the abundant Gammarus of running water; the wood boring Limnoria and Chelura; the blind Niphargus of underground fresh water; the quaint Speetie or Skeleton Shrimp, q.v. (*Caprella*); and many more. See CRUSTACEA.

Amphipolis, a town of Macedonia, on the river Strymon, about 3 miles from the sea. The river flowed almost round the town, nearly forming a circle, whence its name *Amphi-polis* ('around the city'). Taken by the Athenians in 437, it fell into the hands of Philip of Macedon in 358; and afterwards, under the Romans, became the capital of their four Macedonian provinces. It is mentioned in Acts xvii.

Amphisbena, a serpent like, limbless lizard, with naked, scaleless skin, and very short tail. There is no breastbone, and the skull resembles, in some respects, that of serpents. In one genus (*Chirotes*), of the same family there are small fore-legs, but all the rest are limbless. They are harmless forms, chiefly American, living underground, and feeding on insects and worms. See LIZARDS.

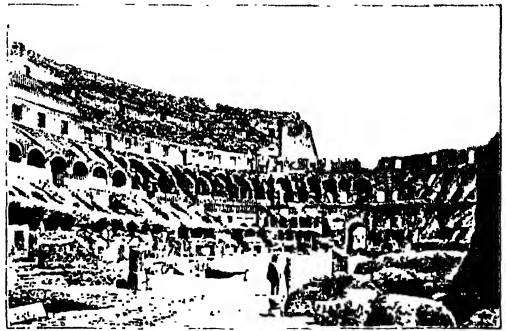
Amphitheatre, a spacious building, generally oval in form, used by the Romans for exhibiting gladiatorial combats, fights of wild beasts, and other spectacles. The amphitheatre differed from a theatre for dramatic performances (*theatrum*) in this, that whereas the theatre had only a semicircle of seats fronting the stage, the amphitheatre was entirely encircled by them; hence the name of amphitheatre (Gr. *amphi*, 'all round'). At first these erections were of wood, and merely temporary, like a modern race-stand. They seem, however, to have been of enormous size, as Tacitus mentions one at Fidenæ, during the reign of Tiberius, whose collapse is said to have caused the death or injury of 50,000 spectators. Amphitheatres of stone had begun, however, to be erected at an earlier period than this, the first having been built in 31 B.C. at the desire of Augustus. The Flavian amphitheatre at Rome, known as the Colosseum from its colossal size, was begun by Vespasian, and finished by Titus 80 A.D., ten years after the destruction of Jerusalem. It was the largest structure of the kind, and is fortunately also the best preserved. It covers about five acres of ground, and was capable of seating 87,000 spectators. Its greatest length is 612 feet, and its greatest breadth 515, the corresponding figures for the Albert Hall in London being 270 and 240. On the occasion of its

dedication by Titus, 5000 wild beasts were slain in the arena, the games lasting nearly a hundred days. The exterior is about 160 feet in height, and consists of three rows of columns, Doric, Ionic, and Corinthian, and, above all, a row of Corinthian pilasters. Between the columns there are



Colosseum—Exterior.

arches, which form open galleries throughout the whole building; and between each alternate pilaster of the upper tier there is a window. Besides the *podium*, there were three tiers or



Colosseum—Interior.

of seats, corresponding to the external tier. The first of these is supposed to have contained twenty-four rows of seats; and the second, sixteen. These were separated by a lofty wall from the third story, which contained the populace. The *podium* was a gallery surrounding the arena, in which the emperor, the senators, and vestal virgins had their seats. The building was covered by a temporary awning or wooden roof, the *velarium*. The open space in the centre of the amphitheatre was called the *arena*, the Latin word for sand, because it was covered with sand or sawdust during the performances. The taste for the excitement of the amphitheatre which existed at Rome, naturally spread to the provinces, and large amphitheatres were erected not only in the provincial towns of Italy, as at Capua, Verona, Pompeii, Pozznoli, &c., but at Arles, Nîmes, and Frejus, in France; at Italica, near Seville, in Spain; and even in this country, at Cirencester, Silchester, and Dorchester.

Amphitrité, a sea-goddess in Greek Mythology, daughter of Nereus, or of Oceanus, and wife of Poseidon. When the latter demanded her in marriage, she fled to Mount Athos, but was discovered by a dolphin, which Poseidon had sent after her, and borne back to him. In sculpture, she is often represented sitting next to Poseidon, or drawn by Tritons.

Amphitryon, in Greek Mythology, a king of Tiryns, son of Alceus, and husband of Alcmene. During his absence from home in order to punish the murderers of his wife's brothers, Alcmene was visited by Zeus in the disguise of Amphitryon, who himself returned home next day. She became the mother of Heracles by Zeus, and of Iphicles by Amphitryon. The story has been treated by Plautus in his *Amphitruo*, and after him by Molière in his *Amphitryon*, a very free adaptation of his original. Here his hero was supposed to be M. de Montespan, husband of the new mistress of Louis XIV. In the latter, Amphitryon gives a great dinner; hence the name has become a common term for a host or entertainer to dinner.

Amphiuma, a North American tailed amphibian, which loses the external gills of its youth. It thus belongs to the eudobranch group of the order Urodela. The form is roughly eel-like, and about 2 feet long; the legs, which are small and distant, have two or three toes; the eyes are covered with skin; and there are numerous teeth. On each side of the somewhat narrowed neck there is a gill slit, partly covered with a fold of skin. This type, like other *Dicelotriton*, as they are called, is thus half-way between those amphibians like Proteus (q.v.), which permanently retain their external gills, and those like the newt, in which the gills entirely disappear in the adults, and the clefts close up. *A. means* is found in the southern and south-western states burrowing in the mud e.g. in the ditches of the rice-fields. It feeds on small fish, molluscs, and insects. The negroes call it the Congo snake, and erroneously regard it as venomous. Another species (*A. tridactyla*) is somewhat doubtfully distinct.

Amphora, among the Greeks and Romans, a large vessel, usually made of clay, with a narrow neck and two handles, and often ending in a sharp point below, for being inserted in a stand or in the ground. It was chiefly used for preserving various liquids, especially wine, and was frequently decorated with paintings. There is also evidence that *amphora* were employed as cinerary urns and as coffins. The Greek *amphora* contained about nine English gallons; the Roman, about six.

Amplitude, in Astronomy, is the distance of a heavenly body, at the time of its rising, or setting, from the east or the west point of the horizon. When the sun is in the equator (i.e. at the time of either equinox), he rises exactly east, and sets exactly west, and therefore has no amplitude. His amplitude is at its maximum at midsummer, and again at midwinter; and that maximum depends upon the latitude of the place, being 23½ at the equator, and increasing to the Arctic Circle, where it becomes 90°. The amplitude of a fixed star remains constant all the year round.

Ampulla, a kind of bottle used by the Romans for the preservation of liquids. It was made either of earthenware or glass, and sometimes, though very rarely, of costlier materials. Great numbers of such vessels have found their way into collections of antiquities. They are generally 'bellied'—i.e. approaching to globular, narrowing towards the mouth, and provided with two handles. They are frequently mentioned in connection with the baths of ancient times. The *ampulla Avaria* was a 'bottle of oil' which the Roman took with him when he went to the bath, and with which he anointed himself after his ablutions. Sometimes the oils were perfumed. The *ampulla Romanensis* (Fr. *la sainte ampoule*) was the name of the famous vessel containing the unguent with which

the French kings were anointed at their coronation at Rheims. The *ampulla*, a vessel for the coronation oil in the English regalia, is in the shape of an eagle. See REGALIA.

Amputation (Lat. *amputare*, 'to lop' or 'prune') is the cutting off of a part which, by its injured or diseased condition, endangers, or may endanger, the safety of the whole body. The amputation of a limb was in ancient times attended with great danger of the patient's dying during its performance, as surgeons had no efficient means of restraining the bleeding. They rarely ventured to remove a large portion of a limb, and when they did so, they cut in the gangrened parts, where they knew the vessels would not bleed; the smaller limbs they chopped off with a mallet and chisel; and in both cases had hot irons at hand with which to sear the raw surfaces, boiling oil in which to dip the stump, and various resins, messes, and fungi, supposed to possess the power of arresting hemorrhage. Some tightly bandaged the limbs they wished to remove, so that they mortified and dropped off; and others amputated with red-hot knives, or knives made of wood or horn dipped in vitriol. The desired power of controlling the hemorrhage was obtained by the invention of the Tourniquet (q.v.), in 1674, by a French surgeon, Morel, and its improvement early in the next century by his countryman Petit. The ancient surgeons endeavoured to save a covering of skin for the stump, by having the skin drawn upwards by an assistant, previously to using the knife. In 1679 Lowdham of Exeter suggested cutting semicircular flaps on one or both sides of a limb, so as to preserve a fleshy cushion to cover the end of the bone. Both these methods are now in use, and are known as the 'circular' and the 'flap' operations; the latter is most frequently used in this country.

A 'flap' amputation is performed thus: The patient being placed in the most convenient position, an assistant compresses the main artery of the limb with his thumb, or a tourniquet is adjusted over it. Another assistant supports the limb. The surgeon with one hand lifts the tissues from the bone, and transfixing them with a long narrow knife, cuts rapidly downwards and towards the surface of the skin, forming a flap; he then repeats this on the other side of the limb. An assistant now draws up these flaps, and the knife is carried round the bone, dividing any flesh still adhering to it. The surgeon now saws the bone. An expert surgeon can remove a limb thus in from thirty to sixty seconds. He then, with a small forceps, seizes the end of the main artery, and while he draws it slightly from the tissue, an assistant ties it with a thread. All the vessels being secured, the flaps are stitched together with a needle and thread, and the wound is dressed.

The question *when* amputation of a limb is necessary, is often, especially after an accident, one of the most difficult in surgery. The chief indications for it in these cases are very extensive destruction or laceration of the skin; injury to the large vessels or nerves; severe splintering of the bones. The diseases most commonly requiring it are—disease of bones or joints, especially when the discharge from it threatens to exhaust the patient; tumours, especially cancer and sarcoma, which cannot otherwise be removed; and gangrene.

Amraoti (sometimes *Omrauttee*), a district in Berar, British India, with an area of 2750 sq. m., and a pop. (1881) of 575,328. Its capital, Amraoti, is an important cotton mart, a terminus of a state branch railway, and the headquarters of the commissioner of the whole province. Pop. (1881) 23,550.

Amritsar (often *Umritsir*), a well-built city of the Punjab, 32 miles E. of Lahore by rail. It is the religious metropolis of the Sikhs, a distinction which, along with its name (literally, 'pool of immortality'), it owes to its sacred tank, in the midst of which stands the marble temple of the Sikh faith. Founded in 1574, but all of it more recent than 1762, it is, next to Delhi, the richest and most prosperous city in Northern India, possessing considerable manufactures of cashmere shawls, cotton, silks, &c., and carrying on trade to the annual value of £3,500,000. Pop. (1881) 151,896, of whom 61,274 were Hindus, and 75,891 Mohammedans.

Amroha, a town in the North-west Provinces of India 20 miles N.W. of Moradabad. Pop. (1881) 36,145, mainly Moslems.

Amru, **IBN AASS**, a celebrated Arab soldier, was at first an opponent of the Prophet, but joined him about 629. He distinguished himself during the conquest of Palestine, and in 638 undertook the conquest of Egypt with a modest force of 4000 Arabs, which grew twentyfold through success. In 641 he took Alexandria (q.v.) after a fourteen months' siege, during which he had lost before the walls 23,000 men. The conquest of Egypt opened to the Arabs the path to conquests westward, and Amru himself overran Tripoli and Barca. He died as governor of Egypt in 664.

Amster, **SAMUEL**, engraver after Raphael and Thorwaldsen, was born at Schinznach in Switzerland, 1791, and became, in 1829, professor of engraving at Munich, where he died, May 18, 1849.

Amsterdam ('dam' or 'dike of the Amstel'), the capital of the Netherlands, is situated at the influx of the Amstel to the IJ or Y (pron. *eye*), an arm (now mostly drained) of the Zuider Zee, 44 miles N.N.E. of Rotterdam by rail. It is divided by the Amstel and numerous canals into a hundred small islands, connected by more than 300 bridges. Almost the whole city, which extends in the shape of a crescent, is founded on piles driven 40 or 50 feet through soft peat and sand to a firm substratum of clay. At the beginning of the 13th century it was merely a fishing-village, with a small castle, the residence of the Lords of Amstel. In 1296, on account of its share in the murder of Count Floris of Holland, the rising town was demolished; but in 1311, with Amstelland (the district on the banks of the Amstel), it was taken under the protection of the Counts of Holland, and from them received several privileges which contributed to its subsequent prosperity. In 1482 it was walled and fortified. After the revolt of the seven provinces (1566), it speedily rose to be their first commercial city, a great asylum for the Flemish Protestants; and in 1585 it was considerably enlarged by the building of the New Town on the west. The establishment of the Dutch East India Company (1602) did much to forward the well-being of Amsterdam, which, twenty years later, had 100,000 inhabitants. In the middle of that century, the war with England so far reduced the commerce of the port that, in 1653, 4000 houses stood uninhabited. Amsterdam had to surrender to the Prussians in 1787, to the French in 1795; and the union of Holland with France in 1810 entirely destroyed its foreign trade, while the excise and other new taxation impoverished its inland resources. The old firms, however, lived through the time of difficulty, and in 1815 commerce again began to expand—an expansion greatly promoted by the opening in 1876 of a new and more direct water-way between the North Sea and the Zuider-Zee.

The city has a fine appearance when seen from the harbour, or from the high bridge over the

Amstel. Church towers and spires, and a perfect forest of masts, relieve the flatness of the prospect. The old ramparts have been levelled, planted with trees, and formed into promenades. Between 1866 and 1876 many spacious streets and an extensive public park were added to the city. Tramways have been successfully introduced, and the harbour greatly improved. There is railway communication with all parts of the country and of Europe. Rich grassy meadows surround the city. On the west side are a great number of windmills for grinding corn and sawing wood. The three chief canals—the Heerengracht, Keizersgracht, and Prinsengracht—run in semicircles within each other, and are from 2 to 3 miles long. On each side of them, with a row of trees and a carriage-way intervening, are handsome residences. The building-material is brick; and the houses have their gables towards the streets, which gives them a picturesque appearance. The defences of Amsterdam now consist in a row of detached forts, and in the sluices, several miles distant from the city, which can flood, in a few hours, the surrounding land. A hard frost, however, like that of 1794-95, when Pichegru invaded the country, would render this means of defence useless.

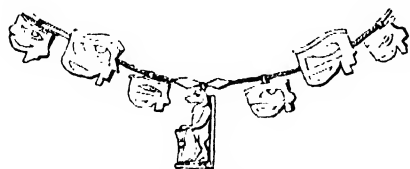
The population, which from 217,024 in 1794, sank to 180,179 in 1815, rose steadily to 366,660 in 1885, of whom the majority belong to the Dutch Reformed Church. Of the remainder, about 80,000 are Catholics, 30,000 German Jews, and 3200 Portuguese Jews. The chief industrial establishments are sugar refineries, engineering works, mills for polishing diamonds and other precious stones, dockyards, manufactories of sails, ropes, tobacco, silks, gold and silver plate and jewelry, colours, and chemicals, breweries, distilleries, with export houses for corn and colonial produce; cotton spinning, book-printing, and type-founding are also carried on. The present Bank of the Netherlands dates from 1824. Amsterdam's famous bank of 1609 having been dissolved in 1796.

The former *Stadhuis* ('Townhouse'), converted in 1808 into a palace for King Louis Bonaparte, and still retained by the reigning family, is a noble structure. Built by Van Kampen in 1648-55, and raised upon 13,659 piles, it extends 282 feet in length, by 235 feet in breadth, and is surmounted by a round tower rising 182 feet from the base. It has a hall, 120 feet long, 57 wide, and 90 high, lined with white Italian marble, an apartment of great splendour. The cruciform *Nieuwe Kerk* (New Church), a Gothic edifice of 1408-14, is the finest ecclesiastical structure in the city, with a splendidly carved pulpit, and the tombs of Admiral de Ruyter, the great Dutch poet Vondel, and various other worthies. The Old Church (*Oude Kerk*), built in the 14th century, is rich in painted glass, has a grand organ, and contains several monuments of naval heroes. Literature and science are represented by a university supported by the municipality (till 1876 known as the *Athenaeum Illustre*), by academies of arts and sciences, by museums and picture galleries, a palace of national industry, a botanical garden, several theatres, &c. The new Lyceum-museum contains a truly national collection of paintings, its choicest treasure being Rembrandt's 'Night-guard.' Rembrandt (q.v.) made Amsterdam his home; and his statue (1852) now fronts the house he occupied. Spinoza was a native. The hospital for aged people, the poor-house, house of correction, the orphan asylums, a navigation school, and many benevolent societies, are well supported, and managed on good principles. A water-supply was introduced in 1853. The North Holland Canal, to which Amsterdam is so largely indebted for the rapid increase of its commerce, is noticed under **ZUIDER ZEE**.

Amsterdam, a barren volcanic islet in 37° 50' S. lat. and 77° 30' E. long., and about midway between the Cape of Good Hope and Tasmania. It is under the governor of Mauritius.

Amu-Daria. See OXUS.

Amulet, any object worn as a charm. It is often a stone, or piece of metal, with an inscription or some figures engraved on it, and is generally suspended from the neck, and worn as a preservative against sickness or witchcraft. Its origin, like its name, seems to be oriental. The ancient Egyptians had their amulets, sometimes forming necklaces. Among the Greeks, such a protective



Egyptian Amulet.

charm was styled *phylacterion*. Pliny gives the Latin name, *amuletum*, a word of unknown origin. It has been conjecturally compared with the modern Arabic *himalah* (literally 'a carrier,' 'bearer'), now applied to a shoulder belt or cord, frequently used to secure a small Koran or prayer-book on the breast, regarded as an amulet; but the resemblance between this word and the Latin *amuletum* is purely accidental. The phylacteries of the Jews (see Matt. xxiii. 5), slips of parchment on which passages of the Law were written, were evidently worn as badges of piety by the Pharisees; but were also regarded as wholesome preservatives from evil spirits, and from all manner of harm. From the heathen, the use of amulets passed into the Christian Church, the usual inscription on them being *ichthys* (the Greek word for a fish), because it contained the initials of the Greek words for Jesus Christ, Son of God, Saviour. Among the Gnostic sects, Abraxas stones (q.v.) were much used. Amulets soon became so common among Christians that, in the 11th century, the clergy were interdicted from making and selling them on pain of deprivation of holy orders; and in 721, the wearing of amulets was solemnly condemned by the church. Among the Turks and the tribes of Central Asia, every person considers it necessary to wear a preservative charm. With the spread of Arabian astronomy, the astrological amulet or Talisman (q.v.) of the Arabs found its way to Europe. Among amulets in repute in the middle ages were the coins attributed to St Helena, the mother of Constantine. These and other coins marked with a cross were thought specially efficacious against epilepsy, and are generally found perforated, for the purpose of being worn suspended from the neck.

Amur (or Amoor, also called Sakhalin), a river formed by the junction (about 53° N. lat. and 121° E. long.) of the Shilka and the Argun, which both come from the south-west, the former rising in the foothills of the Yablonoi Mountains. From the junction, the river flows first south-east and then north-east, and after a total course of 3060 miles, falls into the Sea of Okhotsk, opposite the island of Sakhalin. Its main tributaries are the Sungari and the Ussuri, both from the south. Above the Ussuri, the Amur is the boundary between Siberia and Manchuria; below it, the river runs through Russian territory. It is very valuable for navigation, and carries a considerable fleet of steamers, but on account of the bar at its mouth, goods are generally disembarked, and carried overland to

Alexandrovsk. The river is frozen for six months of the year; in summer there are extensive inundations.

From as early as 1636, Russian adventurers made excursions into the Chinese territories of the Lower Amur. In 1666 they built a fort at Albazin, and succeeded in navigating from that fort to the mouth of the river. In 1685, the fort was taken and destroyed by the Chinese, but was retaken promptly by the Russians, who again, in 1689, abandoned it and the whole of the Amur to the Chinese. But soon fur hunters of Siberia, Russian traders, and adventurers, encouraged by government, continued to pursue their vocations on Chinese ground. In 1854-56 two military expeditions were conducted by Count Muraviev, who twice descended the river, unopposed by the Chinese, and established the stations of Alexandrovsk and Nikolaevsk. In 1858 China agreed to the treaty of Tientsin, by which the boundaries of Russia and China were defined. The left bank of the Amur, and all the territory north of it, became Russian; and below the confluence of the Ussuri, both banks. In 1860, after the occupation of Peking by the British and French, General Ignatieff secured the signature of Prince Kung to a treaty, by which Russia acquired the broad and wide territory comprised between the river Amur and the mouth of the Tumen, extending ten degrees of latitude nearer the temperate regions, and running from the shore of the North Pacific eastward to the banks of the river Ussuri, a principal affluent of the Amur. An enormous advantage to Russia of this acquisition of territory was the fact, that it conferred on that country the advantage of harbours on the Pacific in a comparatively temperate latitude, where navigation is impeded by ice for not more than three or four months a year.

This vast territory falls into two Russian provinces—the Maritime Province between the Ussuri and the sea, and the government of Amur, north of the river. The latter has an area of 175,000 sq. m., and a pop. of 10,500, mostly belonging to the Tungusic stock; the Russian settlers numbering about 8000. The country is richly timbered, and is admirably adapted for pasturage and agriculture, though the climate is severe. On the middle course of the river the summer heat is excessive, and the cold in the long winter very keen. Fur-bearing animals are still plentiful, and the river abounds in fish. The capital is, since 1882, Khabarovka, and not, as formerly, Blagovestschensk. Nikolaevsk, once the only important place in these regions, is on the Amur, 26 miles from its mouth, where the river is 1½ miles wide, and in places 15 feet deep; but the political centre tends southward to the more temperate maritime province (area, 730,000 sq. m.; pop. 74,000), near the southern end of which is situated the important harbour of Vladivostok ('Rule of the East'), or Port May, which, in 1872, was placed in telegraphic communication with Europe by the China submarine cable, and is now the capital of the Amur provinces. The island of Sakhalin (Saghalien), north of the Japan group, along a portion of the coast of Asiatic Russia, and formerly possessed partly by Russia and partly by Japan, is also a part of the Amur region in the wider sense.

Amurnath, a cave in Cashmere, amidst the mountains on the north-east boundary. It is an opening in a gypsum rock, 30 yards high, and 20 in depth. Believed to be the residence of the god Siva, it is visited by multitudes of pilgrims.

Amyclæ, (1) an ancient town of Laconia, on the eastern bank of the Eurotas, 2½ miles SE. of Sparta. It was the home of Castor and Pollux, the 'Amyclidean brothers.' It was conquered by the Spartans

only before the first Messenian war.—(2) An ancient town of Latium, which claimed to have been built by a colony from the Greek Amyclæ.

Amygdaleræ, a sub-order of Rosaceæ (q.v.). See also ALMOND, CHERRY, PEACH, NECTARINE, PLUM.

Amygdalin, $C_{20}H_{27}NO_{11} \cdot 3H_2O$, is a crystalline principle existing in the kernel of bitter almonds, the leaves of the *Prunus lauro-cerasus*, and various other plants, which, by distillation, yield hydrocyanic acid. It is obtained, by extraction with boiling alcohol, from the paste or cake of bitter almonds, which remains after the fixed oil has been separated by pressure. When obtained pure, it has a sweetish, somewhat bitter taste, and is not poisonous, and when treated with alkaline solvents, ammonia is expelled, and amygdalic acid, $C_{20}H_{25}O_{12}$, is produced. Its most remarkable change is, however, that which is noticed in the article Volatile Oil of Almonds (q.v.), and which may be thus briefly stated. When the bruised almond kernel, or almond paste, is brought in contact with water, the peculiar odour of bitter almonds is almost immediately evolved; and in twenty-four hours all traces of amygdalin will have disappeared, its place being taken by essential oil of almonds, hydrocyanic acid, sugar, and formic acid. This transformation is due to the presence of a peculiar nitrogenous matter called Emulsin (q.v.), or syntapase, which sets up a kind of fermentation.

Amygdaloid (Gr. *amygdalê*, 'an almond'), an igneous crystalline or, as the case may be, vitreous rock (lava), containing numerous cells, which owe their origin to the segregation and expansion of steam, with which all lavas are more or less charged at the time of their eruption. The cells vary in size from mere pores up to cavities several inches or even feet in diameter—these last, however, being exceptional, and when they do occur, quite sporadic. The cells are generally flattened or drawn out in the direction of flow of the lava, and are frequently filled with mineral matter (amygdules), subsequently introduced by infiltrating water. This is the origin of many of the agates and so-called 'Scotch pebbles' of jewellers. As cells and cellular structure occur in many different kinds of igneous rock, the term *amygdaloid* no longer denotes a rock-species, and has therefore fallen into disuse. It is now only employed in the adjectival form, *amygdaloidal*, as indicating a cellular or slaggy-like structure, in which the pores and cells are more or less filled up with mineral matter.

Amyl, C_5H_{11} , is the fifth in the series of alcohol radicals whose general formula is C_nH_{2n+1} , and of which methyl and ethyl are the first two members. It is obtained by heating amyl iodide with an amalgam of zinc in a closed tube at a temperature of about 350° F. (177° C.), and is one of the natural products of the distillation of coal. As thus obtained, it represents two molecules of the radical united together, and usually goes by the name *diamyl*, $(C_5H_{11})_2$. The single molecule, C_5H_{11} , has not been produced. Diamyl is a colourless liquid, with a specific gravity of 770 at 52° F. (11° C.), and a boiling-point of about 316° F. (158° C.). It has an agreeable smell and burning taste. It enters into a large number of chemical combinations, most of which—as, for instance, bromide, chloride, iodide, &c.—are derived from amylic alcohol, which bears precisely the same relation to amyl (at ordinary alcohol bears to ethyl, C_2H_5). Amylic alcohol is sufficiently described in the art. of FISH. OIL, which is the name given to the crude alcohol. It seems invariably to accompany ordinary alcohol when the latter is prepared by fermentation, and apparently occurs in largest quantity in those

liquids which remain most alkaline during fermentation.

AMYL, NITRITE OF, $C_5H_{11}NO_2$, a valuable drug which must not be confounded with *Nitrate of Amyl*, may be prepared by the action of nitric acid on fusel oil (amylic alcohol). It is a pale yellowish liquid, with an ethereal fruity odour, the vapour of which, when inhaled, even in very small quantity, causes violent flushing of the face and a feeling as if the head would burst. It is a very powerful remedy in all convulsive diseases, and is of special value in angina pectoris, as well as in asthma. Owing to its volatile nature it is usually kept in small glass globes containing from two to five drops, one of which, when crushed in the handkerchief, and the vapour breathed, will often give immediate relief.

Amyloid (Lat. *amylum*, 'starch') is a term used in Chemistry and Botany, and generally equivalent to 'starchy.' Amyloids are substances like starch, dextrine, sugar, gum, &c., which consist of carbon, hydrogen, and oxygen, the latter two being always in the proportion in which they occur in water, H_2O . The animal body, chemically considered, is a mixture of Proteids (q.v.), amyloids or carbohydrates, and Fats (q.v.), plus water and mineral constituents, and the normal food always contains these constituents. Of the three items, proteids are, however, absolutely essential, amyloids and fats only desirable accessories. In the human body the most important carbohydrates are glycogen, $C_6H_{10}O_5$; grape-sugar or dextrose, $C_6H_{12}O_6$; maltose, $C_{12}H_{22}O_{11}$; and milk sugar, $C_{12}H_{22}O_{11}$. See ANIMAL CHEMISTRY. A compound radical called *amyl* is formed by the decomposition of starch in a peculiar fermentation—the *amyliferous fermentation*—but to it the term amylaceous has no reference.

Amyot, JOSEPH, oriental scholar, was born at Toulon in 1718, and lived as a Jesuit missionary in China from 1750 till his death in 1794. His knowledge of the Chinese and Tartar languages enabled him to go to head sources for his knowledge of the antiquities, history, language, and arts of China. Most of his writings may be found in the *Mémoires concernant l'Histoire, les Sciences et les Arts des Chinois* (16 vols. Paris, 1776-1814). His *Dictionnaire Tartar-Manchou-Français* was edited by Lauglé in 1789.

Amyridaceæ, a sub-order of Terebinthaceæ, consisting of tree and shrubs remarkable for the abundance of their fragrant resinous juice. To the sub-order belongs Myrrh (q.v.), Frankincense (q.v.), &c.

An'a, a termination added to proper names to designate collections of sayings, 'table-talk,' also q.v. as *Johnsoniana*, *Boswelliana*; as well as notes about some person, or publication bearing upon him, as *Shakespeareana*, *Burtoniana*. Such titles were first used in France, where they became common after the publication of *Sedigitana* by the Brothers Dupuy (1666). In English literature there are many works of this kind, from *Baconiana* (1679) to *Delcensiana* (1886). America, also, has its *Washingtoniana* (1800). A fairly complete catalogue of such works up to its own date may be found in Nannet's *Bibliographie des Ouvrages publiés sous le Nom d'Ana* (Brussels, 1839).

Anabaptists, a term often applied to those Christians who reject infant baptism and administer the rite only to adults; so that when a new member joins them, he or she, if baptised in infancy, is baptised a second time. The name (from Gr., 'to baptise again') is thus due to an accidental circumstance, and is disclaimed by the more recent opponents of infant baptism both on the Continent

and in Great Britain. It is properly applied to a set of fanatical enthusiasts called the Prophets of Zwickau, in Saxony, at whose head were Thoma: Münzer (1520) and others, who appeared shortly after the beginning of the Reformation. Münzer went to Waldshut, on the borders of Switzerland, which soon became a chief seat of anabaptism, and a centre whence visionaries and fanatics spread over Switzerland. They pretended to new revelations dreamed of the establishment of the kingdom of heaven on earth, and summoned princes to join them, on pain of losing their temporal power. They rejected infant baptism, and taught that those who joined them must be baptised anew with the baptism of the Spirit; they also proclaimed the community of goods and the equality of all Christians. These doctrines naturally fell in with and supported the 'Peasant War' (q.v.) that had about that time (1525) broken out. The sect spread rapidly through Westphalia, Holstein, and the Netherlands, in spite of the severest persecutions. At the battle of Frankenhausen the princes of Saxony, Hesse, and Brunswick crushed its progress in Saxony and Franconia. Still, scattered adherents of the doctrine continued. Melchior Hoffmann, a furrier of Swabia, who appeared as a visionary preacher in Emden in 1528, installed a baker, John Matthiesen, of Haarlem, as bishop. Matthiesen began to send out apostles of the new doctrine. Two of these went to Münster, where they found fanatical coadjutors in the Protestant minister Rothmann, Knipperdolling, Bockhold, and others. With their adherents, they soon made themselves masters of the city; Matthiesen set up as a prophet, and, encouraged by a previous success, lost his life in a mad sally, with only thirty followers, against Count Waldeck, the prince-bishop of Münster, who was besieging the town. The churches were now destroyed, and twelve judges were appointed over the tribes, as among the Israelites, and Bockhold (1534) said himself crowned king of the 'New Zion,' under the name of John of Leyden. The anabaptist madness in Münster now went beyond all bounds. The city became the scene of the wildest licentiousness; until several Protestant princes, uniting with the bishop, took the city and by executing the leaders after the cruellest tortures, put an end to the new kingdom (1535).

But the principles disseminated by the Anabaptists were not so easily crushed. Adherents of the sect had been driven to the Netherlands; and in Amsterdam the doctrine took root and spread. Bockhold also had sent out apostles, some of whom had given up the wild fanaticism of their master; abandoning the community of goods and women, they taught the other doctrines of the Anabaptists, and the establishment of a new kingdom of pure Christians. They grounded their doctrines chiefly on the Apocalypse. One of the most distinguished of this class was David Joris, a glass-painter of Delft (1561-56) who devoted himself to mystic theology, and sought to effect a union of parties. He acquired many adherents, who studied his Book of Miracles (*Wunderbuch*), which appeared at Deventer in 1542, and looked upon him as a sort of new Messiah. Being persecuted he withdrew from his party, lived modestly at Bael, under the name of John of Bruges; and died there in the communion of the reformed church.

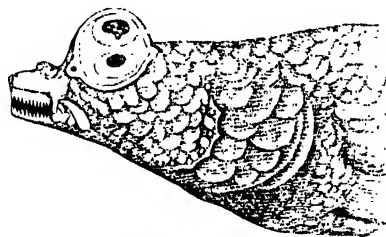
The rude and fanatical period of the history of anabaptism closes with the scandal of Münster. A new era begins with Menno Simons (see MENNONITES), who collected many of the scattered adherents of the sect, and founded congregations in the Netherlands and in Germany. His followers, however, expressly repudiated the distinctive doctrines of the Münster fanatics: and so little had their

sober and moderate life in common with the excesses of the latter, that the application of the term Anabaptists to them is unjustifiable. As a matter of fact, the German Anabaptists have left no representatives; and those bodies in England and America who only resemble them in the practice of adult baptism are discussed under the title of BAPTISTS.

Anabasidae. See CLIMBING PERCH.

Anabasis (Gr., literally, 'an ascent' or 'a march out of a lower into a higher country'), the name of two historical works: (1) The *Anabasis of Cyrus*, written by Xenophon, which gives a narrative of the unfortunate expedition of the younger Cyrus against his brother, the Persian king Artaxerxes, and of the retreat of his 10,000 Greek allies under the command of Xenophon, after the battle of Cunaxa (401 B.C.). (2) The *Anabasis of Alexander*, written by Arrian, and giving an account of the campaigns of Alexander the Great.

Anableps (Gr. *anablepsis*, 'looking up'), a genus in Agassiz's exyrinodont family of bony fishes with open air-bladders. They are especially noteworthy for their projecting eyes, which are divided into an upper and lower portion. The *or* or *ocula* is crossed by a dark band, and the inner *iris*



Anableps tetrapthalmus.

is similarly divided, so that there are really two pupils instead of one. This unique structure is supposed to be associated with a habit which these fishes are said to have of swimming with the eyes partly out of the water. *S. betrophthalmus* inhabits the rivers of Gujara and Surinam.

Anabolism. the constructive processes within the protoplasm, by which food or other material, at a relatively low level, passes through an ascending series of ever more complex and unstable combinations, till it is finally worked up into living matter. See METABOLISM, PHYSIOLOGY, and PROTOPLASM.

Anacardiaceæ. See TEREBINTHACEÆ; also
CASHEW NUT, PISTACHIA, MANGO, TURPENTINE
TREE.

Anacardium. See CASHEW NUT.

Anaëcharis, a genus of plants of the natural order Hydrocharideæ, of which a species, *Anaëcharis alsinistrum* (*Elodea canadensis*), has become naturalised in Brit. in. It is a native of North America, growing in ponds and slow streams; and is a dark-green, much-branched perennial, entirely floating under water. The male flowers are seldom observed, and British specimens are exclusively female, the male plant happily not having been introduced. The plant was first found in Britain in 1812, by the late Dr Johnston, in the lake of Dims Castle; and again in 1847 by Miss Kirby, in the reservoirs of a canal in Leicestershire. It is now very abundant and troublesome in the Trent, Derwent, and other rivers; in fact much more so than in America. Its rapidity of growth is extraordinary. Immense masses disfigure the shallows of the Trent, and cover the

beds of the deeps. It strikes its shoots under the mud in a lateral direction for six inches or a foot, and then rises and spreads. The stems are very brittle, and every fragment is capable of growing,



Anacharis alismastrum

so that the means usually adopted to get rid of it serve rather for its propagation. It appears that water-fowl are very fond of it; and by them, probably, its seeds may be conveyed from one river to another. It has been found that swans may be fed upon it with advantage, and its excessive growth kept down more effectually in this way than in any other. It seems to be an impediment to the progress of salmon ascending the rivers in which it occurs; but for some kinds of fish it probably affords both food and shelter. The manner of its introduction into Britain is unknown, although it has been conjectured that it may have escaped from some garden-pond—a conjecture the more doubtful, from the distance between the localities in which it was first found; but its rapid increase is of great scientific interest, in connection with the important subject of the distribution of species. As being calculated to block up water-courses, the plant involves some serious economic considerations. It is remarkable that in North America, its native land, it never grows so as to block the rivers. The plant is also of interest to vegetable physiologists, since exhibiting peculiarly well, under moderate power of the microscope, the phenomenon of circulation of the protoplasm within the cells.

Anacharsis, a Scythian prince who travelled widely in quest of knowledge, and visited Athens in the time of Solon. He was received with great respect for his remarkable wisdom, and was admitted to the Athenian franchise. The letters which bear his name were written long after his time. It is said that, after his return to his native land, he was put to death by order of the king, who feared the introduction of the Greek mysteries, in which it was supposed that Anacharsis had been initiated. J. J. Barthélemy (q.v.) borrowed his name for that of the hero of his *Voyage du Jeune Anacharsis en Grèce* (1788).

Anacharsis, a Scythian prince who travelled widely in quest of knowledge, and visited Athens in the time of Solon. He was received with great respect for his remarkable wisdom, and was admitted to the Athenian franchise. The letters which bear his name were written long after his time. It is said that, after his return to his native land, he was put to death by order of the king, who feared the introduction of the Greek mysteries, in which it was supposed that Anacharsis had been initiated. J. J. Barthélemy (q.v.) borrowed his name for that of the hero of his *Voyage du Jeune Anacharsis en Grèce* (1788).

Ana'chronism (Gr. *ana*, 'backwards,' *chronos*, 'time'), the erroneous reference of a circumstance or custom to a wrong date; as when Shakespeare, in *Titus and Cressida*, makes Agamemnon quote Aristotle, or Raphael represents the Blessed Virgin as an Italian *contadina*. Etymologically, it should apply only to a date which is too early—*prochronism*, but it is also used of too late a date—*para'chronism*. Anachronisms may be made in regard to mode of thought and style of writing, as well as in regard to mere events; and, indeed, many persons lack the historical sense and the feeling of historical perspective so much, that their whole conceptions of the past are nothing but a continuous anachronism. It is difficult for a writer to project himself so completely into a past age as to breathe freely in its atmosphere. Most of our so-called historical novels, however good as novels, are of but little value to the serious student of history. Even the glowing imagination of a Scott or Kingsley can hardly make more of their old-world

figures than nineteenth-century men and women in antique garb. There is hardly a novel of its class that contains more study than Thackeray's *Esmond*, yet here a Jacobite whistles 'Lilliburlero,' and a book is spoken of in 1712 which was not published until 1750. Sometimes an anachronism is purposely made for the sake of effect, or to bring certain events within convenient compass for dramatic purposes. Thus, Shakespeare makes Cassius say, in *Julius Caesar*, 'The clock hath stricken three;' and Schiller, in his *Piccolomini*, introduces a lightning-conductor more than a hundred years before the date of its invention. These discrepancies, however, do not seriously injure the general truth of a poetical work. The anachronism is more offensive when, in a work which pedantically adheres to the costumes and other external features of old times, we find a modern style of thought and language, as in the old French dramas of Corneille and Racine. In popular epic poetry it is a common feature. Achilles is always young; Helena, always beautiful. In their versions of old classic traditions, the writers of the middle ages converted Alexander, Æneus, and other ancient heroes, into good Christian knights of the 12th century. In the *Nibelungen-Lied*, Attila and Theodoric are good friends and allies, though the latter began to reign some forty years after the former. At the end of the poem, the heroine, who must have been nearly sixty years old, is still 'the beautiful Queen Kriemhild.'

Anacolu'thon is a term employed both in Grammar and Rhetoric, to denote the absence of strict logical sequence in the grammatical construction. Good writers sometimes sacrifice the logical sequence to emphasis, clearness, or graceful arrangement. An example is Coleridge's 'His young and open soul dissimulation is foreign to its habits.' In colloquial speech, nothing is more common than examples of anacoluthon.

Anaconda (*Eunectes murinus*), a large South American water-snake of the Python family, closely related to the boa-constrictor. The upper part of the front of the head is armed with shield-like plates, replaced by scales farther back. The minute vertical nostrils at the end of the snout can be entirely closed, a fact in association with the aquatic habit of the animal. In size it is hardly exceeded, unless by the pythons, as some specimens have measured from 25 to 30 feet in length. The general colour of the adult is blackish green, with rows of spots along the back and sides. Traces of the hind-legs can be detected. The anaconda is ovoviviparous. It is found in the rivers of Guiana and Brazil, swimming like an eel, or floating with the stream, or lying in wait by the bank for the agoutis, pacas, capybaras, ant eaters, iguanas, &c. on which it feeds. It is comparatively helpless on land, and is then often killed. The skin is used for making boots and bags, the fat is also utilised, and the flesh is sometimes eaten. See BOA CONSTRICTOR, and PYTHON.

Ana'creon, one of the most esteemed lyric poets of Greece, was born about 550 B.C. at Teos, an Ionic city in Asia Minor. With his fellow-townsmen he emigrated to Abdera, in Thrace, on the approach of the Persians. Thence he was invited to the court of Polycrates, the ruler of Samos; and here he sang, in light and flowing strains, the praise of wine and beauty. After the death of Polycrates, he went to Athens, and was received with distinguished honour by Hipparchus. We know nothing certain of his life after the fall of Hipparchus, but that he left Athens; and tradition tells that he died at the age of 85, by being choked by a dried grape.

Great honours were paid to him after his death; Teos put his likeness upon its coins, and a statue was raised to him on the Acropolis of Athens, which represented him in a state of vinous hilarity.

Of his poems, only a few genuine fragments have been preserved, for the *Odes* attributed to him are now admitted to be spurious. Of these there are about sixty, devoted to love and wine, marked by great simplicity and delicacy of expression, fertility of invention, and variety of illustration. Moore found a congenial task in translating them into English verse. The genuine fragments appear in Bergk's *Poete Lyrici Græci* (4th ed. 1878).

Anacyclus. See PELLETORY OF SPAIN.

Anadyom'éné ('emerging'), the goddess rising out of the sea, a name given to Aphrodite from her being born of the foam of the sea. Apelles gave the name its celebrity from his masterpiece, a painting of the goddess in the moment of rising from the sea, wringing her flowing wet hair. Phryne was supposed to have supplied the model for this masterpiece of Apelles. The inhabitants of the island of Cos bought the picture, and placed it in the temple of Esculapius. Augustus afterwards placed it in the temple of Venus as the ancestress of the Julian house.

Anadyr, or ANADIR, a sea or gulf of North-east Siberia, and a resort of whalers. The Anadyr River flows into the Gulf of Anadyr, after a course of about 500 miles from the Stanovoi Mountains, through a rocky and barren country.

Anæmia (Gr., 'bloodlessness') is a comprehensive term employed to denote those conditions in which there is a diminished quantity of blood, or a smaller number of its corpuscles, than in health. In some forms of disease in which anæmia is a characteristic feature, there is an absolute reduction in the amount of blood in the body; in others there is merely a reduction in the number of the red corpuscles; and in others again the reduced number of the red is accompanied by an increase in the number of the white corpuscles. The symptoms present in anæmia are weakness and languor; tendency to headaches, especially at the top of the head, and to neuralgias in various situations; singing in the ears, and troubles connected with the sight; palpitation and faintness; breathlessness on exertion; sleeplessness and irritability; poor appetite and weak digestion; with habitual constipation, and, in women, disorders of the catamenial functions. The patient presents a pinched appearance, the face being pale, and the lips, gums, and mucous membrane of the eyelids bloodless; the skin has a dull aspect, and the hair is scanty. In many of the cases there may be no emaciation—rather, on the other hand, a tendency to plumpness; but the muscles are flabby, and there is frequently also dropsy about the ankles. There are always abnormal sounds or murmurs in the vessels, especially the veins, and frequently also in the heart, which is enlarged by dilatation. In some cases even of ordinary anæmia there is enlargement of the spleen, and, more rarely, of the liver. Occasionally there is albumen in the urine. The blood in health should contain 5,000,000 red corpuscles per cubic millimetre, but on estimating it in anæmia there may be a great reduction in the number. The white corpuscles are estimated to be present in health in the ratio of one to three hundred or five hundred, but this ratio may be altered by a relative or absolute increase of the white cells.

The causes of anæmia, following Os¹, may be divided into two groups, according as they act upon the blood directly, or upon the blood-forming structures. Under the first division must

be placed losses of blood by hemorrhage, as, for instance, from the stomach, lungs, or uterus, in which there may be a great diminution in the quantity of the blood, with a corresponding reduction of the red blood corpuscles, and a lesser reduction of the white cells; losses produced by a drain on the albuminous elements of the blood by pus-formation, albuminuria, or lactation; diminished blood-formation by want of food, or conditions preventing its reception or assimilation by the organism, in which the blood-plasma loses more than the blood-corpuscles—as examples of which, may be mentioned inanition, diseases of the gullet, and simple chlorosis; and, lastly, the effects of certain poisons which interfere with blood-formation, such as metallic substances like mercury or lead, and organic agents like malaria. In all these forms of anæmia, the treatment consists in the removal, if possible, of the cause, the enjoyment of sunlight and fresh air, with good food and the administration of iron. In the second group, there fall to be considered causes which act by disturbing the functions of the blood-making organs—to wit, the spleen, the bone marrow, and the general lymphatic tissues of the body. Curiously enough, when there is enlargement of any of these structures, there is a disturbance of its functions. Enlargement of the spleen is always followed by the *anæmia splenica* of Griesinger, a common sequel to malaria; changes in the marrow of the bones is often associated with the form of anæmia known as idiopathic, or progressive pernicious anæmia; and affections of the general lymph-glands throughout the body are associated with anæmia, in the disease known as adenia or Hodgkin's disease. In all these affections there is no increase in the number of the white cells; but there is another analogous disease characterised by changes in the spleen marrow, and glands, associated with an increase in the white cells, and reduction of the red corpuscles. This is the affection known as leucæmia. In all these diseases arsenic appears to be the only remedy of any utility, but most of them are in our present state of knowledge incurable.

Anæsthæsia (Gr., 'lack of sensation') is a term used to express a loss of sensibility to external impressions, which may involve a part or the whole surface of the body. It may occur naturally as the result of disease, or may be produced artificially by the administration of *anæsthetics*. In some diseased conditions of the nervous centres, a part of the body may become totally insensible to pain, while in another part sensation may be unnaturally acute, constituting a state of hyperæsthæsia. When a nerve is divided, there is no feeling of touch or pain referred to the parts which it supplies, because these are cut off from communication with the brain; and in some diseases, as the *elephantiasis graveorum*, a loss of sensation in patches of the skin is an early and characteristic symptom. Insensibility to external impressions may be either *general*—i.e. affecting the whole body, or *local*, where only that part is affected to which the anæsthetic agent is applied.

In ancient writers, we read of insensibility or indifference to pain being obtained by means of Indian hemp (*Cannabis indica*), either smoked or taken into the stomach. The Chinese, more than 1500 years ago, used a preparation of hemp, or *ma-uo*, to annul pain. The Greeks and Romans used mandragora for a similar purpose (*poicin anæsthêsian*); and as late as the 13th century, the vapour from a sponge filled with mandragora, opium, and other sedatives was used. The mandragora, however, occasionally induced convulsions, with other alarming symptoms; and though

Bullein, an English physician (died 1579), mentions the possibility of putting patients who were to be operated upon into 'a trance or a deepe terrible dreame' by its use, it gradually became obsolete, and was banished from the pharmacopœia. John Baptista Porta, of Naples, in his work on Natural Magic (1597), speaks of a quintessence extracted from medicines by somniferous *menstrua*. This was kept in leaden vessels, hermetically closed, lest the *aura* should escape. 'When it is used, the cover being removed, it is applied to the nostrils of the sleeper, who draws in the most subtle power of the vapour by smelling, and so blocks up the fortress of the senses, that he is plunged into the most profound sleep, and cannot be roused without the greatest effort. . . . These things are plain to the skilful physician, but unintelligible to the wicked.' In 1784, Dr Moore, of London, used compression on the nerves of a limb requiring amputation, but this method was in itself productive of much pain. In 1800, Sir Humphry Davy, experimenting with the nitrous oxide or *laughing-gas*, suggested its usefulness as an anæsthetic; and in 1828, Dr Hickman suggested carbonic acid gas.

As early as 1795, Dr Pearson had used the vapour of sulphuric ether for the relief of spasmodic affections of the respiration. The fact that sulphuric ether could produce insensibility was shown by the American physicians, Godwin (1822), Mitchell (1832), Jackson (1833), Wood and Baché (1834); but it was first used to prevent the pain of an operation in 1846, by Dr Morton, a dentist of Boston. The news of his success reached England on 17th December 1846; on the 22d, Mr Robinson, a dentist, and Mr Liston, the eminent surgeon, operated on patients rendered insensible by the inhalation of sulphuric ether. This material was extensively used for a year, when Sir J. Y. Simpson, of Edinburgh, discovered the anæsthetic powers of *Chloroform* (q.v.), and introduced the use of it into his special department, midwifery. Since that time, chloroform has been the anæsthetic in general use in Europe, but ether is preferred in America. It is now the opinion of most medical men that chloroform should not be given where there is weak action of the heart from disease. Other substances have been used by inhalation, such as nitrous oxide gas, which is the best and safest anæsthetic for operations that last only one or two minutes, as in the extraction of teeth; bichloride of methylene and tetrachloride of carbon have also been employed, but are not so reliable as those above mentioned.

The employment of general anæsthetics in surgery has greatly increased the scope of the surgeon's usefulness, and has been a great boon to suffering humanity. It is, however, fraught with a certain amount of danger. If, however, much care may be taken in its administration, an occasional fatal accident occurs from the action of the anæsthetics employed. In these cases, there is generally disease of the heart, or a hypersensitive nervous system, predisposing to sudden sinking, or to shock.

Local anæsthesia, artificially produced, is of great value in minor operations, and in painful affections of limited areas of the body. It depends upon a paralysis of the sensory nerves of the part, and may be induced by the application of a class of medicinal agents. An ether spray (thrown on the part, produces such intense cold by its evaporation, that the part is completely numbed, and a layer of ice forms on its surface. The after effect, however, when reaction sets in, is very painful, and there is danger that if weak constitutions sloughing and ulceration may follow. Of medicinal agents, the best is *cochine*, prepared from the coccæ shrub of Peru (*Erythrococcus coccæ*). In the

form of a five to ten per cent. watery solution, this drug is introduced into the tissues by a hypodermic needle, and produces complete anæsthesia of the part thus treated in from three to fifteen minutes. Rarely it produces giddiness, but has no unpleasant local after effects. Thymol, menthol, aconite, belladonna, chloroform (the last three as the well-known A B C liniment), phenol, chloral, and Indian hemp, have also a local anæsthetic action if rubbed on the skin, or applied to abraded surfaces.

Anagallis. See PIMPERNEL.

Anagni, a town of Italy, on a hill, 40 miles ESE. of Rome. The seat of a bishop since 487, it has an old, but much modernised cathedral, and was the birthplace of four popes: Innocent III., Gregory IX., Alexander IV., and Boniface VIII. The chief city of the Hernici, it was a place of importance during the whole period of Roman history, and Virgil mentions it as 'wealthy Anagnia.' Pop. 6347.

Anagram (Gr. *ana*, 'up,' and *gramma*, 'a letter of the alphabet'), the transposition of the letters of a word, phrase, or short sentence, so as to form a new word or sentence. It originally signified a simple reversal of the order of letters, but has long borne the sense in which it is now used. The Cabalists attached great importance to anagrams, believing in some relation of them to the character or destiny of the persons from whose names they were formed. Plato entertained a similar notion, and the later Platonists rivalled the Cabalists in ascribing to them mysterious virtues. Although now classed among follies, or at best among ingenious trifles, anagrams formerly employed the most serious minds, and some of the Puritan writers commended the use of them. Cotton Mather, in his elegy on the death of John Wilson, the first pastor of Boston, in New England, mentions

His care to guide his flock and feed his Lambs.

By words, works, prayers, psalms, hymns, and *anagrams*.

The best anagrams are such as have, in the new order of letters, some signification appropriate to that from which they are formed. It was a great triumph of the mediæval anagrammatists to find in Pilate's question, '*Quid est veritas*?' (What is truth?) its own answer: '*Ei vir qui adest*!' (It is the man who is here). With equal appropriateness, Horatio Nelson may read '*Honour est a Nō*?' (Honour is from the Nile, and Florence Nightingale 'Flit on, cheering angel.' Anagrams, in the days of their popularity, were much employed, both for complimentary and for satirical purposes; and no little straining was often employed in the omission, addition, or alteration of letters, although, of course, the merit of an anagram depended much upon its accuracy. An interesting survival of anagram-making was seen in the absurd word-competitions for large money prizes, offered about the time of Queen Victoria's jubilee (1887), ostensibly to celebrate the occasion.

Marie Touchet, the name of a favourite mistress of Charles IX. of France, was read '*Je charme tout*' (I charm every one); the flatterers of James I. of England, and in his name, James Stuart, 'a just master, and proved his right to the British monarchy, as the descendant of the mythical King Arthur, from his name (Charles James Stuart, which becomes 'Claims Arthur's Seat.' But perhaps the happiest of anagrams was that which laughed back to sanity Lady Eleanor Davies, the wife of the celebrated Sir John Davies the poet. The poor lady was half-crazy, and she began to fancy herself a prophetess, because she discovered that from the letters of her own name could be read 'Revel, O Daniel.' Political prophecy was a dangerous

game under Charles I., and at last she found herself arraigned before the Court of High Commission. Judge and bishop reasoned with her in vain, until the Dean of Arches laughed her out of court by finding also in her name, Dame Eleanor Davies, the unfortunate words, 'Never so mad a Ladie.'

Many of the pseudonyms adopted by authors have been merely transposed forms of their own names; thus Calvinus becomes 'Aleninus,' François Rabelais, 'Alofribas Nasier;' Bryan Waller Proctor, 'Barry Cornwall, poet.' The most famous name of this class, that of 'Voltaire,' was formed from 'Arouet, l. j.'—i.e. 'Arouet the younger.' See Wheatley, *On Anagrams* (1862).

Anahuac (a term signifying, in the old Mexican language, 'near the water'), the original name of the ancient kingdom of Mexico. It is now used to designate either the whole of the tableland of Mexico or certain portions thereof, more or less extensive, with the capital as a common centre. This plateau has a height of from 6000 to 8000 feet above the sea, and is generally level, though the great volcanoes of Jorullo and Popocatepetl rise out of it. The plateau, which comprises three-fifths of the republic of Mexico, is bounded east and west by the two great chains of the Cordilleras. The Anahuatlans, perhaps so called as living near the numerous lakes of the great plateau, are the Aztecs, and figure prominently in the ancient history of Mexico (q.v.).

An'akim, a people living in the south of Palestine, and especially about Hebron, then called Kirjath-arba. They are described in Scripture as a race of giants, and their name may come from a Hebrew root meaning strength or stature. They are also called 'Sons of Anak,' and were dispossessed by Joshua. See Num. xiii.

Anal Glands, pouches from the end of the intestine beside the anus. They occur especially in mammals, but also in snakes, lizards, and other reptiles, and in some invertebrates, such as insects, and consist of cells which exhibit a special development of the general glandular properties so abundantly associated with the skin. It is impossible to draw any hard and fast line between true anal glands and the numerous glandular pouches occurring in various parts of the body—e.g. head, back, groin, limbs, and external generative organs. The secretion of the glandular cells has usually a strong smell, and a fatty or oily composition. They are sometimes of protective advantage, and in other cases doubtless auxiliary to sexual attraction. See SKIN GLANDS, MUSE GLANDS, BEAVER, OVER SKIN.

An'alogue, a technical term in Biology, used to denote physiological, independent of morphological resemblance. Organs are *analogous* to one another, or are *analogues*, when they perform the same function, though they may be altogether different in structure; as the wings of a bird, and the wings of an insect. Organs, again, are *homologous*, or *homologues*, when they are constructed on the same plan, undergo a similar development, and bear the same relative position, and this independent of either form or function. Thus, the arms of a man and the wings of a bird are homologues of one another, while the wing of a bird and the wing of a bat are both analogous and homologous. See HOMOLOGOUS, and MORPHOLOGICAL.

Analogy, a term, originally Greek, which signifies an agreement or correspondence in certain respects between things in other respects different. It makes a resemblance of relations, as in the phrase, 'Knowledge is to the mind what light is to the eye.' Euclid employed it to signify proportion, or the equality of ratios, and it has retained this

sense in mathematics; but it is a term little used in the exact sciences, and of very frequent use in every other department of knowledge and of human affairs. In Grammar, we speak of the analogy of language—i.e. the correspondence of a word or phrase with the genius of the language, as learned from the manner in which its words and phrases are ordinarily formed. Analogy, in fact, supposes a rule inferred from observation of instances, and upon the application of which, in other instances not precisely, but in some respects, similar, we venture, with more or less confidence, according to the degree of ascertained similarity, and according to the extent of observation from which our knowledge of the rule has been derived. The opposite to analogy is *anomaly* (Gr., 'irregularity'); and this term is used not only in grammar, but with reference to objects of natural history which in any respect are exceptions to the ordinary rule of their class or kind. Here it strictly means the resemblance of function between organs which are essentially different (see ANALOGUE above).

In the progress of science, analogies have been discovered pervading all nature, and upon which conclusions are often based with great confidence and safety. It is a kind of presumptive reasoning from parallel cases that indeed warrants only probable conclusions; but the probability may become of a very high degree, and in the affairs of life we must often act upon conclusions thus attained. Reasoning from analogy, however, requires much caution in the reasoner. Yet even when its conclusions are very uncertain, they often serve to guide inquiry and lead to discovery. Many of the most brilliant discoveries recently made in natural science were the result of investigations thus directed. Where the proper evidence of truth is of another kind, arguments from analogy are often of great use for the removal of objections. It is thus that they are employed by Bishop Butler in his *Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature*. In law, reasoning from analogy must often, to a certain extent, be admitted in the application of statutes to particular cases. Upon similar reasoning the practice of medicine very much depends. To discover the meaning of any literary work, it is also often necessary; the sense of the author in a passage somewhat obscure being in some measure determined according to passages in which he has expressed himself more clearly. The application of this rule to the interpretation of Scripture is a point of difference between Protestants and Roman Catholics, the latter insisting upon the interpretation of difficult passages solely by ecclesiastical tradition and authority, while the former claim the right to apply analogy of interpretation. The inspiration of Scripture, however, when fully admitted, warrants a more confident use of analogical reasoning than in the case of the works of an uninspired author.

Analysis (Gr., 'taking apart') and its converse *Synthesis* ('putting together') are now generally used to designate two complementary processes, the correlatives of each other, employed in chemistry, logic, mathematics, and philosophy. Analysis is the resolution of a whole into its component parts, the tracing of things to their source, and so discovering the general principles underlying individual phenomena; Synthesis is the explanation of certain phenomena by means of principles which are for this purpose assumed as established. Analysis, as the resolution of our experience into its original elements, is an artificial separation; while synthesis is an artificial reconstruction. We speak of an *analytic* method in science, and of a *synthetic* method; and both are necessary, the one coming to

the assistance of the other to secure against error, and promote the ascertainment of truth. The analytic method proceeds from the examination of facts to the determination of principles, from the individual to the universal; whilst the synthetic method proceeds to the determination of consequences from principles known or assumed, to the individual from the universal. It will thus be seen that they are really two necessary parts of the same method, and that, whereas the value of the synthesis depends on the accuracy of the analysis which has established the principle from which the synthesis sets out, so, on the other hand, an analysis which does not aspire to a synthesis, halts on the way. Synthesis without analysis gives a false science, since it is a pure imagination, based simply on hypothesis; and analysis without synthesis gives an incomplete science. The ideal of science and of philosophy can only be attained by a method which combines the two processes, and the test of the perfection of a theory is the harmony of the results obtained by them.

The part of Herbert Spencer's *Psychology* which he calls Special Analysis (following the preliminary General Analysis), has 'for its aim, to resolve each species of cognition into its components. Commencing with the most involved ones, it seeks by successive decompositions to reduce cognitions of every order to those of the simplest kind; and so, finally, to make apparent the common nature of all thought, and disclose its ultimate constituents; while the synthesis describes the nature and genesis of the different modes of intelligence. In *Logic*, analysis is the division of a concept into the qualities or attributes of which it is constituted (see ABSTRACTION), whilst synthesis is the reverse process of adding together the qualities or attributes which determine a particular concrete. See GENERALISATION, INDUCTION, LOGIC, ALGEBRA, GEOMETRY.

In *Grammar*, analysis is a term much used since 1852 for the school exercise of distinguishing the different elements composing a sentence, or any part of it. It is allied to logical analysis, being a systematic resolution of the sentence into elements, performing different functions in the expression of thought, with definite relations to the whole sentence and to each other, as *subject* and *predicate*, with their respective *adjuvants*. Dr Morell was one of the first of English grammarians to make a systematic use of this method in books for teaching.

Mathematical Analysis, in the modern sense of the term, is the method of treating all quantities as unknown numbers, and representing them for this purpose by symbols, such as letters, the relations subsisting among them being thus stated and subjected to further investigation. It is therefore the same thing with algebra in the wide sense of that term, although the term algebra is more strictly limited to what relates to equations, and thus denotes only the first part of analysis. The second part of it, or analysis more strictly so called, is divided into the Analysis of Finite Quantities, and the Analysis of Infinite Quantities. To the former, also called the Theory of Functions, belong the subjects of Series, Logarithms, Curves, &c. The Analysis of Infinites comprehends the Differential Calculus, the Integral Calculus, and the Calculus of Variations (see the several articles). To the diligent prosecution of mathematical analysis by the minds of the greatest acuteness, is to be ascribed the great progress both of pure and applied mathematics within the last two centuries.

The analysis of the ancient mathematicians was a thing entirely different from this, and consisted simply in the application of the analytic method as opposed to the synthetic, to the solution of geometrical questions. That which was to be proved

being in the first place assumed, an inquiry was instituted into those things upon which it depended, and thus the investigation proceeded, as it were, back, until something was reached which was already ascertained, and from which the new proposition might be seen by necessary consequence to flow. A reversal of the steps of the inquiry now gave the synthetical proof of the proposition. The modern mathematical analysis affords a much more easy and rapid means of solving geometrical questions; but the ancient analysis also afforded opportunity for the exercise of much acuteness, and was the chief instrument of the advancement of mathematical science until comparatively recent times. The invention of it is ascribed to Plato; but of the works of the ancients on geometrical analysis none are extant, except some portions of those of Euclid, Apollonius of Perga, and Archimedes.

Analysis, in Chemistry, is the term applied to that department of experimental science which has for its object the chemical disunion or separation of the constituents of a compound substance; thus, the resolution of water into its components hydrogen and oxygen; of common salt into chlorine and sodium; of marble into lime and carbonic acid; of rust into iron and oxygen; of sugar into carbon, hydrogen, and oxygen; and of chloroform into carbon, hydrogen, and chlorine are all examples of chemical analysis. This department of chemistry, therefore, takes cognisance of the breaking down of the more complex or compound substances into their more simple and elementary constituents, and is antagonistic to *chemical synthesis*, which treats of the union of the more simple or elementary bodies to produce the more complex or compound. Chemical analysis is of two kinds: *Qualitative* analysis, which determines the quality or nature of the ingredients of a compound, without regard to the quantity of each which may be present; and *quantitative* analysis, which calls in the aid of the balance or measure, and estimates the exact proportion, by weight or volume, in which the several constituents are united. Thus, *qualitative* analysis informs us what water, marble, common salt, &c. are composed of; but it remains for *quantitative* analysis to tell us that water consists of 1 part of hydrogen by weight united with 8 parts of oxygen; that marble is composed of 56 parts of lime, and 44 of carbonic acid; common salt, of 35½ parts of chlorine, and 23 of sodium; turpentine of 30 carbon, and 4 hydrogen; chloroform, of 12 carbon, 1 hydrogen, and 106½ chlorine.

The divisions of inorganic (mineral) chemistry and organic (vegetable and animal) chemistry have a corresponding classification of chemical analysis into *inorganic* analysis, comprehending the processes followed and the results obtained in the investigation of the atmosphere, water, soils, and rocks; and *organic* analysis, treating of the modes of isolation, and the nature, of the ingredients found in or derived from organised structures, viz. plants and animals. Both departments afford examples of what are called *proximate* and *ultimate* analysis. Proximate analysis is the resolution of a compound substance into components which are themselves compound; thus, in inorganic chemistry, marble is resolved into lime (calcium united with oxygen) and carbonic acid (carbon united with oxygen); whilst ultimate analysis comprehends the disunion of a compound into its *elements* or the simplest forms of matter; thus, lime into calcium and oxygen; carbonic acid into carbon and oxygen; water into hydrogen and oxygen. Organic chemistry affords still better examples of each class; thus, ordinary wheat-flour, when subjected to proximate analysis, yields, as its proximate components, gluten (vegetable fibrin), albumen, starch, sugar, gum, oil, and saline matter;

but each of these proximate ingredients is in itself compound, and when they undergo ultimate analysis, the gluten and albumen yield, as their ultimate elements or constituents, carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus; and the starch, sugar, gum, and oil are found built up of carbon, hydrogen, and oxygen.

Several other terms are in use in chemical treatises: thus, *Gas analysis* is applied to the processes employed in the examination of the various gases, and is every day becoming of more and more importance and interest. *Metallic analysis* includes the smelting of metallic ores, the assay of alloys of gold, silver, &c., and, in general, everything that pertains to the ultimate analysis of metallic ores and compounds. *Agricultural analysis* is restricted to the examination of manures, feeding-stuffs, and soils; *Medical or Physiological analysis*, to the investigation of blood, urine, and other animal fluids and juices, and the examination of medicinal compounds; whilst *Commercial analysis* is the term used where great accuracy or nicety of detail is not required in an analysis, but where the commercially important constituents alone are determined, as the separation and reording of the amount of phosphates, ammonia, and alkaline salts in a sample of guano; the total amount of saline matter in a certain water; the iron in an ironstone, the lime in a limestone, &c.

Generally speaking, there are three methods in use in analysis. These are the *Volometric*, *Gravimetric*, and *Spectroscopic*. The *Volometric* method submits the sample to certain characteristic reactions, employing as reagents liquids of known strength, called standard solutions; and by means of colour tests determines when a certain reaction is complete (see ALKALIMETRY). From the data thus obtained, it is possible to calculate the weight of substance present in the sample under examination. The *Gravimetric*, on the other hand, seeks to precipitate the metal or other substance in a convenient form for weighing, and makes constant use of the Balance. The *Spectroscopic* method depends on the separation of the different rays of light by means of a Spectroscope (q.v.). The substance under examination is usually volatilised in the flame of a Bunsen burner; and when the spectroscope is applied, coloured lines, varying with different substances, are seen across the spectrum, and enable the analyst to detect the most minute proportions with certainty.

COMMERCIAL OR PHARMACEUTICAL ANALYSIS differs from inorganic or organic analysis, pure and simple, in dealing usually with complex mixtures, to which it is impossible to apply tests having a definite value as to the information they afford. Thus, a mixture of various inorganic salts can be analysed with certainty by proceeding on well-known rules; but, as yet, no one can be confident in the analysis of an unknown mixture containing, perchance, sirups or tinctures, along with infusions of animal or vegetable origin. To such a mixture it is necessary to apply many physical processes, in the hope that these will so separate the constituents as to render it possible to recognise them either by appearance, odour, or specific test. Thus it comes about that a knowledge of experimental physics, no less than of chemistry, is essential to the successful analyst. In the following paragraphs it is proposed to indicate the physical processes which let the most light into the darkness of an unknown commercial mixture, but for details the reader must consult a practical treatise.

Distillation.—The mixture being placed in a glass flask furnished with a thermometer, heat is applied, and the boiling-point noted. If this gradually rises, it indicates that the mixture contains more than one volatile liquid; and by

separating the various portions of distillate, according to the temperature at which they pass over, it is often possible to obtain the samples sufficiently pure to be recognised. The term *fractionation* or *fractional distillation* is applied to this method. If a non-volatile residue remains in the flask, it must be examined from other points of view. Thus, substances may be divided into: (1) Volatile—e.g. alcohol, ether, &c.; (2) Not volatile except along with other bodies—e.g. glycerine, which cannot be distilled alone, but passes over along with water vapour; (3) Non-volatile—e.g. fixed oils, olive, rape, &c.

Solution.—This may be applied in two ways. The solvent, be it alcohol, ether, water, or other liquid, is shaken with the substance under examination, and in many cases dissolves one ingredient, to the exclusion of others. Thus, it is desired to know how much oxide of iron is present in a sample of polishing-paste. Treatment with ether dissolves the fatty substances, and leaves the oxide free to be estimated in the usual manner. The other way consists in shaking ether or chloroform with the watery solution of the substance, when it will be found that some of the ingredients (more soluble in these liquids than in water) have been dissolved, and may be obtained on evaporation.

Rotation of the Polarised Ray.—It is found that many substances, and even the solutions of optically active compounds, have the power of rotating the plane of polarisation of a ray of light, and in many cases the extent of this rotation is sufficient to detect not only the presence but even the proportions of the substance to which it is due. Such bodies as sugar, turpentine, alkaloids, camphor, albumen, &c. exert this power.

Fluorescence (q.v.) is often of great assistance in commercial analysis. Thus, it is possible to pronounce the intense bitterness of a sirup to be due not to quinine, but to some other bitter, if no fluorescence is apparent; while the green fluorescence often noted on pens is a clear indication that the ink employed contains some colouring matter other than indigo, probably an aniline dye.

Melting and Solidifying Point.—The knowledge of this is of much importance, as, for example, in a case where common or other resins had been mixed with small pieces of amber. In such a case, the more fusible resin would melt and run away, leaving the bodies of higher melting-point. In other cases where no separation takes place, as with various kinds of wax, it enables the presence of paraffin or other foreign bodies to be detected. Adulteration of essential and fixed oils may frequently be exposed by this simple test.

Ignition on a piece of platinum or a porcelain dish is the simplest method of removing organic matter from inorganic, the latter usually remaining behind as a residue.

The specific gravity, the colour, odour, taste, crystalline form, solvent powers, and inflammability are all important factors in commercial analysis; while even such an apparently simple property as the size of drop which falls from a vessel containing the liquid, is in some cases the crucial test which decides as to the purity or otherwise.

The *spectroscope* is a powerful instrument, especially in pharmaceutical analysis. When a glass vessel, containing a tincture of a drug, is examined through the spectroscope, absorption spectra are seen (see SPECTRUM), and as these are characteristic of various herbs, they have been much used in recognising their presence in mixtures.

Sublimation.—When very carefully heated under a watch-glass, many alkaloids and other active principles yield sublimate having a characteristic crystalline form, which is easily recognised when examined under the microscope.

Microscopical Examination is a *sine quâ non* when flour, or indeed any organic powder, is in question. Under the microscope, the different forms of starch are easily recognised, and by counting the granules of each variety in the visible field, one can arrive at the approximate proportions of each that are present.

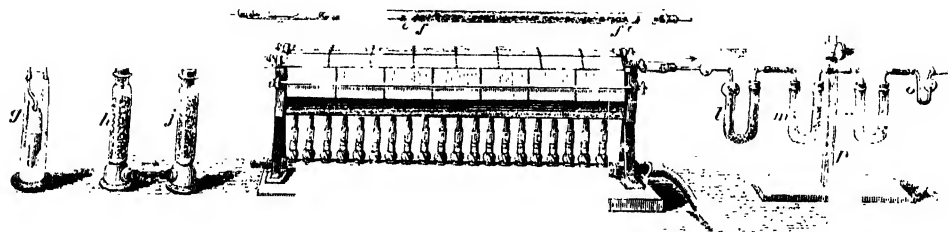
Such, then, are some of the most valuable methods of commercial analysis; and in the examination of an unknown substance, many or all of them must be tried, the ingenuity of the chemist having here unbounded scope. For instance, supposing a mixture contained olive-oil, chloroform, glycerine, alcohol, and flour, the following course (capable of infinite variation) would soon lead to the detection of its ingredients. The microscope would at once pronounce as to the name of the starch, and after filtration through paper, the liquid being placed in a flask and heated, the chloroform and alcohol would pass over into the receiver. The residue of glycerine and olive oil being non-miscible, could be readily separated into its two constituents, each of which could be recognised by specific gravity, taste, or solubility, as well as other more chemical tests. The chloroform and alcohol, on being poured into water, would at once separate into two layers, the lower of chloroform with a trace of alcohol, the upper of water and alcohol with a trace of chloroform. Numerous precautions are of course necessary to make sure that no substance remains undetected, and in many cases the chemist tries to re-combine his mixture from the separate pure ingredients, so as to give greater certainty to his conclusions. Such a method is called the *synthetic* one. See ADULTERATION.

ORGANIC ANALYSIS. The analysis of that class of substances commonly known as organic compounds, is a process which requires to be varied very considerably, according to the nature of the compound to be analysed, and according to the elements which it contains. Every so-called organic compound contains carbon as one of its essential constituents, but no sharp distinction, except of a purely artificial kind, can be drawn between organic and inorganic carbon compounds. Those elements which, besides carbon, are pre-eminently conspicuous in the composition of the majority of undoubtedly organic compounds, are hydrogen, oxygen, and nitrogen. Many hundreds of compounds exist which contain only carbon and hydrogen; some very large classes of compounds contain oxygen in addition to these two; while

compounds containing nitrogen, in addition to hydrogen, or oxygen, or both, are also very numerous. Besides these large classes, however, many organic compounds exist, containing sulphur, phosphorus, chlorine, bromine, iodine, or other non-metallic element, or almost any of the known metals.

When a new compound has been isolated in what is believed to be a pure state, it is of the utmost importance, from a chemical point of view, that its qualitative and quantitative composition should be determined. From its origin, it is often possible to say what elements it is likely or unlikely to contain, but a qualitative search must be made to prove the presence or absence of particular elements. In order to test for carbon, and simultaneously for hydrogen, the substance is mixed with black oxide of copper (cupric oxide), which, as well as the substance itself, must be quite free from moisture, and then heated to redness in a hard glass tube. Carbon is oxidised, by the oxygen of the cupric oxide, to carbonic acid, which may be recognised by passing it through a small bent tube, containing in the bend a few drops of lime-water, when a white precipitate of calcium carbonate is produced; hydrogen is also oxidised, forming water, drops of which will condense in a cold glass tube placed in front of the one containing the lime-water. The test usually employed in searching for nitrogen, is to heat a small quantity of the substance with a fragment of sodium in a narrow glass tube, then to grind up the tube and its contents under water, and to seek in the solution thus obtained for the presence of sodium cyanide. The presence of oxygen may be ascertained by heating the substance to be tested, to a red heat in a current of pure and dry hydrogen gas, and observing the formation of water. The methods of testing for other elements cannot be described at length, but the general rule is to destroy the organic matter, either by heating alone, or by action of powerful oxidising agents, such as nitric acid, and then to test by suitable means, as in inorganic analysis, for the products formed by such heating or oxidation.

The simplest case of the quantitative analysis of an organic compound is that when the compound contains carbon and hydrogen only, or these two along with oxygen. In such a case, the method almost universally adopted now is what is known as the *open tube combustion* method, or the combustion of the substance in a tube contain-



Apparatus fitted for an Open Tube Combustion :

a is the combustion tube shown separately, the ends of which are fitted with rubber corks, bored for the introduction of glass tubes; *b* is cupric oxide confined by stoppers of cork; *c* is the 'back' or 'gas' tube, containing the substance, and *d* a piece of glass to contain solution of caustic potash; *e* is the gas funnel, containing solution of caustic potash; *f* is the gas funnel, containing sulphuric acid respectively, to purify and dry the current of air; *g* is the gas funnel, containing sulphuric acid, and serves to indicate the rate of exit of gas by the bubbling.

ing red-hot cupric oxide, through which a current of air or oxygen is passed during the operation. For the purpose of such a combustion, a tube of highly infusible glass is employed, some thirty inches long, open at both ends, and having an

internal bore of about half an inch. This tube is filled, from the middle to within two inches or so of one end, with coarsely powdered cupric oxide, which is held in its place by two plugs of not too tightly packed asbestos. The ends are fitted with

stoppers of red rubber, perforated so as to admit of the introduction of narrow glass tubes. Thus arranged, the tube is placed horizontally, with the ends projecting about two inches at each side, in a gas furnace (which is the modern representative of the old charcoal furnace at one time exclusively used), and carefully heated up to bright redness, while a current of dry air or oxygen is passed slowly through it, entering at the end which is not occupied by the cupric oxide, and passing out again at the other end. This preliminary ignition is to remove all traces of organic matter and moisture from the tube itself, and its contents, and it is continued for half an hour or longer. The current of air or oxygen is purified from traces of carbonic acid, and from aqueous vapour, by passing it first through strong solution of caustic potash contained in a washing-bottle, next through a tube containing pieces of solid caustic potash, and finally through one or more tubes containing fragments of pumice moistened with strong sulphuric acid. When the ignition has been continued for a sufficiently long time, part of the gas is turned out, so as to allow the front part of the tube to cool, the cupric oxide, however, being kept hot. After this, the weighed tubes, which are to collect the products of the combustion, are fitted air-tight to the exit end of the combustion tube. These consist of, first, a U tube of special shape, packed with fragments of pumice moistened with strong sulphuric acid, in which the whole of the water is condensed and collected; and second, one or more U tubes containing granulated *soda-lime** in which carbonic acid is absorbed. Before escaping from the last soda lime tube, the unabsorbed gases pass through a short layer of fragments of dried calcium chloride, to retain water vapour liberated by the action of carbonic acid on the soda lime. When the front part of the tube is nearly cold, the india-rubber stopper is removed, the weighed quantity of the substance to be analysed, contained in a platinum or porcelain 'boat,' is introduced into the tube, and the stopper rapidly replaced. A slow current of dry air being again passed through the tube, the substance is then very slowly and cautiously heated, so as to cause it to burn slowly; and, by degrees, the whole of the cool part of the tube is heated, eventually to bright redness, and this heat is maintained until the substance is completely burned, oxygen being passed through to complete the process if necessary. The products of combustion are entirely swept out of the combustion tube, and into the weighed tubes, by continuing the air-current for some time after the substance is entirely burned. These tubes are then detached, allowed to cool, and weighed. The percentages of hydrogen and carbon in the substance are calculated from the weights of water and carbonic acid respectively obtained.

As a rule, the percentage of oxygen contained in an organic substance is estimated by difference. Several methods for the direct determination of oxygen have been proposed, but none of these have come into common use.

The determination of nitrogen is carried out in two ways, depending on the nature of the substance to be analysed. One method is to convert the nitrogen into ammonia, by ignition with soda lime in a tube closed at one end, the quantity of ammonia being subsequently determined by one of several methods. In other nitrogen compounds, it is not possible to convert the whole of the nitrogen into ammonia in this way. In such cases, a combustion of a special kind has to be made, with cupric oxide, in a tube closed at one end when the

nitrogen is obtained in the uncombined state as gas, and its volume is measured. From the observed volume, the weight can be calculated by a simple formula.

The methods employed to determine the quantities of elements less frequently occurring as constituents of organic compounds, such as sulphur, phosphorus, iodine, &c., are very numerous, and some are very complicated; hence they could not profitably be discussed here in any detail. Suffice it to say, as has been said already under the qualitative testing, that the first step is almost invariably one involving the destruction of the organic compound as such, by some oxidising process, after which the products can be treated exactly as would be done in the case of inorganic quantitative analysis.

Analysis, SPECTRUM. See SPECTRUM.

Analyst, PUBLIC. In the Sale of Food and Drugs Act (1875), it is enacted that certain specified local authorities may appoint one or more persons possessing competent knowledge, skill, and experience, as analysts of all articles of food and drugs sold within their district. In most of the large towns in England and Scotland, the authorities have appointed analysts; but in very many places of considerable importance this has not been done. Unfortunately the Act leaves the appointment of analysts permissive.

In section 12 of the Act, it is enacted that any purchaser of an article of food or drug in any place where there is an analyst, shall be entitled, on payment to such analyst of a sum not exceeding 10s. 6d., to have such article analysed by such analyst, and to receive from him a certificate of the result. Private individuals are generally content merely to receive the certificate, and rarely if ever take any further action. In order, therefore, that the Act should not become inoperative, and that dealers guilty of selling adulterated food might be tried and punished for the offence, inspectors were appointed, whose duty consists in going to the various shops and other places where food is sold, making purchases of the different articles therein exposed for sale, and submitting these to the public analyst for examination. If the analyst certifies that any of the substances submitted to him have been adulterated, the inspector must take steps to have the seller prosecuted. A case is prepared for trial, and if the judge is satisfied that an offence within the meaning of the Act has been committed, he convicts the accused, who is then liable in a penalty not exceeding £20. The existence of these functionaries, however, does not prevent any member of the public from purchasing any article of food and submitting it for analysis to the public analyst. Only, if it is intended to take legal action, certain formalities must be observed when making the purchase. Thus, after the material has been bought and paid for, and is in the buyer's possession, he must intimate to the seller that it has been bought for the purpose of being analysed, and he must offer to divide it. If his offer is accepted, he must then and there divide it into three portions, each of which must be sealed in the seller's presence. One of the portions so sealed is to be left with the seller, so that he may, if he be so advised, have an analysis made of it on his own account. Another portion is to be taken to the public analyst for analysis, and the third is to be retained intact till after the trial, in order that the judge may, if he deems such a course advisable, direct that it be sent for analysis to the government analysts at Somerset House. In the event of the seller not accepting the offer of the buyer to divide the material, the buyer must then carry the whole to the analyst, who will divide it into two portions, one of which

* Soda-lime is a mixture of sodium and calcium hydrates, prepared by slaking quicklime with caustic soda solution, and drying up the product.

he will retain, the other he will seal and return to the buyer.

Although public analysts are appointed in the first place by local authority, their appointment is not legal until it has been confirmed by one of Her Majesty's principal secretaries of state; and an analyst, when once appointed, cannot be removed without a like sanction from one or other of these officials.

Analytical Chemistry. See ANALYSIS (in 'Chemistry').

Analytical Languages. See PHILOLOGY.

Anam. See ANNAM.

Anamirta. See COCCULUS INDICUS.

Anan'as. See PINE APPLE.

Ananiev, a town of Southern Russia, in the government of Kherson, 100 miles N. of Odessa. Pop. (1881) 16,449.

Anapa, a seaport town, on the eastern shore of the Black Sea, in Russian Caucasus, lying nearly 50 miles SE. of Yenikale. It has a good harbour, and is strongly fortified; and is accordingly an important garrison and naval station, having a brisk trade with Trebizond. Its fortifications were destroyed by the Russians in the Crimean war, but it was speedily reoccupied. Pop. 5037.

Anarchism (Gr. *an*, 'not,' and *arché*, 'rule') properly means the negation of government, and has quite a distinct meaning from *Anarchy* in the usual acceptance of the word. In its ordinary sense, anarchy is a state of society without any regular government, when social and political confusion prevails in its midst. *Anarchism*, on the other hand, is the name adopted by a phase of revolutionary socialism. The acknowledged father of anarchism, as a form of recent and contemporary socialism, is Proudhon. Proudhon was an eccentric and paradoxical thinker, with a passionate and exaggerated love of individual freedom. Government of man by man he considered to be oppression, an interference with freedom. He therefore regarded a form of society without government, in which every man should be a law to himself, as the goal of human evolution. Since Proudhon, the most prominent exponent of the anarchist theory has been the Russian Bakunin (q.v.), who, in various writings, and by an active propaganda, diffused it in most of the Romance countries. His ideas may be traced in the Paris Commune, in Spain during the risings of 1873, in Italy, and in French Switzerland. The best-known representatives of it are the Russian scientist, Prince Kropotkin, and the distinguished French geographer, Elisee Reclus. At the anarchist trial at Lyons, in 1883, the accused, including Kropotkin, drew up a declaration which may be regarded as the most important statement of their position.

It is not easy to define the anarchist views, but the following are undoubtedly the leading points: They desire complete liberty for all men. They object to all authority, whether monarchic or republican, whether based on divine right or universal suffrage, for history teaches that all government tends to privilege and oppression. In all human relations their ideal is one of free contract, perpetually subject to revision and amendment. But such an ideal of freedom cannot be realised in a society where land and capital are the monopoly of a class. Land and capital must therefore be the common property of society, at the disposal of every one. They wish equality, equality of fact, as a corollary, or rather fundamental condition, of liberty: that all men may have daily bread, knowledge and work, independence and justice. As the essential means for bringing about this new evolution of society, they insist on the uni-

versal diffusion of knowledge. When natural laws shall have been understood, and the knowledge of them universally diffused among men, there will be no need for external authority. Natural laws being recognised by every man for himself, he cannot but obey them, for they are the laws also of his own nature; and the need for political organisation and administration will at once disappear. With reference to the old system of society which stands in the way of the new era, Bakunin recommends a most unsparing policy of destruction. As the theory of anarchism is unlimited freedom and the negation of government, it is difficult to realise how society in its wider aspects can be carried on in consistency with it. Anarchists, however, seem to agree in believing that the free commune or free association will be the fundamental form of society; and there will be a free federation of free associations, leading to the universal and international solidarity of the workers of all countries, and transcending all the limits and obstacles raised by so-called patriotism and national jealousy. Society will be a free grouping of peoples in accordance with natural needs freely realised. But the future form of society is the work of coming generations, and will proceed out of the movement and life of the people. The work of the present is the removal of the old, and the universal diffusion of true science among the masses. It will be seen that anarchism has two aspects: it has a political theory, the negation of government or of external authority; and it has an economic theory as to land and capital, which is common to it with other forms of socialism. See SOCIALISM, NIHIISM.

Anarrhichas. See WOLF-FISH.

An'as, a Limæan genus (now largely subdivided), including ducks, geese, swans, &c. See DUCK, GOOSE, SWAN, &c.

Anastasius, the name of four popes, the first and most eminent of whom held that office for only three years (398-401). He enforced celibacy on the higher clergy, and was a strong opponent of the Manicheans and Origen.

Anastasius I., emperor of the East, was born in 430 A.D., at Dyrrachium, in Epirus, and was proclaimed emperor on the death of Zeno in 491. He suppressed the cruel and degrading spectacles where men fought with wild beasts; abolished the sale of offices and the tax on domestic animals, which had existed since the days of Vespasian; built a wall on the west side of Constantinople to defend it from the incursions of the barbarians; and constructed aqueducts and harbours. He carried on successful wars with the Isaurians and Persians. But he was anathematised by the pope for sympathy with the Eutychean heresy, and as a heretic had to contend with a widespread revolt. He died in 518.

—**ANASTASIUS II.,** emperor of the East, mounted the throne in 713 but was deposed two years later by his mutinous soldiers. He retired to a cloister, and an attempt to recover his crown cost him his life in 719.

Anastatica. See ROSE OF JERICHO.

Anastatic Printing. See PRINTING.

Anastomosis (Gr., 'the making of a mouth or opening'), an anatomical term used to express the union of the vessels which carry blood or other fluids, and also, for convenience sake, the junction of nerves. The veins and absorbents anastomose to form large single trunks, as they approach their ultimate destinations. The arteries break up into small branches for the supply of the tissues, and each small vessel, again, communicates with others given off above and below. Round each large joint there is very free anastomosis, so that the safety of the limb beyond may not be

entirely dependent on the single arterial trunk passing into it, exposed as it is to all the obstructive influences of the different movements of the joint. After the main artery has been permanently obstructed, the anastomosing vessels enlarge, so as to compensate for the loss; but after a time, only those whose course most resembles the parent trunk continue enlarged, and the others gradually regain their ordinary dimensions.

An idea of the profusion of this anastomosing system may be formed from the fact, that if the innominate artery, or great vessel destined for the supply of the right upper half of the body, be tied, and those on the left side injected with size and vermilion, the injection will flow freely into the arteries of the right arm, through branches as minute as they are numerous.

Arteries
anastomos

Anathema (Gr., 'a thing set up or hung up'), a word originally signifying some offering or gift to the gods, generally suspended in the temple. It also signifies a thing devoted; a thing devoted to destruction (the equivalent of the Hebrew *Cherem*); and was ultimately used in its strongest sense, implying perdition, as in Rom. ix. 3; Gal. i. 8, 9. In the Catholic Church, from the 9th century, a distinction has been made between excommunication and anathematising; the latter being the extreme form of denunciation against obstinate offenders. The first general council (Nice, 325 A.D.) anathematised those who held the Arian heresy. It thus declared that they were excluded from the communion of the church, and that if they persisted in their offence they must perish eternally (see EXCOMMUNICATION). *Anathema Maranatha* (1 Cor. xvi. 22) is not, as commonly understood, a more fearful kind of curse; the Syriac words, *Maranatha* ('Our Lord cometh'), should, according to the best authorities, be read as a separate sentence, as in the Revised Version.

Anatolia, a Greek name for Asia Minor (q.v.). The word is derived from the Gr. *Anatole*, 'the rising of the sun,' 'the east'; so that as a word it has the same meaning, though not the same application as the Italian *Lecante*, used of all the countries lying east of the Mediterranean; and the same as *Orient*, derived from the Latin, used of the 'East' in the widest sense. From Anatolia is formed the Turkish *Anadolı*, generally applied to the western and northern portions of Asia Minor.

Anatomy (Gr. 'a cutting up or dissecting') is the science of the form and structure of organised bodies, and is practically acquired by separation of the parts of a body, so as to show their distinct formation, and their relations to each other. It is therefore a branch of the science of Biology, which consists of two great divisions: the Anatomy of animals, styled *Zootomy*, and that of plants, *Phytotomy*. The various divisions of Anatomy will be found at the end of the following historical sketch.

History of Anatomy.—It is difficult to determine the date at which this science began to be cultivated, but it is probable that from the earliest times some persons took advantage of favourable circumstances to acquaint themselves with it. Alcmeon of Crotona, a disciple of Pythagoras, and Democritus are said to have dissected animals with the view of obtaining comparative knowledge of human anatomy. Hippocrates (q.v.), born at Cos about 460 B.C., though the father of medicine, is less justly regarded as the father of anatomy, as

his views of the structure of the human body are very superficial and incorrect. Aristotle, born 384 B.C., is really the founder of the science. He seems to have based his systematic views of comparative anatomy on the dissection of animals, but does not appear to have dissected men. He first gave the name *aorta* to the great artery. No real progress in human anatomy was made, owing to the researches being confined to animals, till the time of Erasistratus (250 B.C.), who was the first to dissect human bodies—the bodies of criminals. Herophilus also is said to have dissected living subjects. Celsus (63 B.C.) in his *De Medicina* wrote much on anatomy.

Galen (131 A.D.) dissected apes, as being most like human subjects, though he occasionally obtained bodies of persons found murdered; and his writings show a knowledge of human anatomy. Soranus, Oribasius, Nemesius, Meletius, and Theophilus based their anatomical works mainly on Galen. Anatomy made small progress among the Arabs, as their religion prohibited contact with dead bodies. Avicenna (980 A.D.), born in the province of Khorassan, was a good osteologist, and described some structures not alluded to by Galen.

The medical school at Bologna became famous in the 13th century, as did also those at Padua and Salerno; but no very material progress was made in anatomy. Mondino, born at Milan, 1315, professed anatomy there, and is considered the real restorer of anatomy in Italy. Then came Guy de Chauliac, Mathæus de Gradibus (1480), Gabriel de Zerbi (1495), Achillini (1512), Berenger of Carpi (1578), Etienne, Massa, and Sylvius (1539). An epoch is made by Andrew Vesalius (q.v.), who published a great work on anatomy before he was 28 years of age.

William Horman of Salisbury wrote, in 1530, *Anatomia Corporis Humani*. Thomas Gemini of London, in 1545, engraved upon copper the anatomical figures of Vesalius, which had appeared in Germany upon wood. Gemini suppressed the name of Vesalius, though using his figures and descriptions. Thomas Vicary, in 1548, is said to be the first who wrote in English on anatomy; he published *The Englishman's Treasure, or the True Anatomy of Man's Body*. Franco (1556), Valverde, and Columbus wrote works of great merit on anatomy. In 1561 Gabriel Fallopius (q.v.) taught with great distinction at Padua, and made many original discoveries.

In the 17th century, progress was rapid. Harvey, in 1619, discovered the circulation of the blood, and the microscope was employed to detect the structure of minute vessels. Aselli, in 1622, discovered and demonstrated the existence of the lymph-vessels. The glandular organs were investigated by Wharton, while Malpighi, Swammerdam, and the illustrious Ruysch, by the use of injections and the aid of the microscope, gave a new impulse to research in the minute structures. Eminent names in the history of anatomy are numerous in the 18th century. In Italy, which still retained its former pre-eminence, we find Paccioni, Valsalva, Morgagni, Santorini, Mascagni, and Cotunni; in France, Winslow, D'Aubenton, Lientaud, Vieq d'Azyr, and Bichat, the founder of general anatomy; in Germany, Haller and Meckel prepared the way for greater achievements in the 19th century; in Great Britain, Cowper, Cheselden, Hunter, Cruikshank, Monro, and Charles Bell contributed to the progress of the science; while Holland was worthily represented by Boerhaave, Albinus, Camper, Sandifort, and Bonn. On the boundaries of the two centuries, we find the names of Sömmerring, Loder, Blumenbach, Hildebrand, Reil, Tiedemann, and Seiler.

The necessity of a union of theory and practice

has led to the study of **PATHOLOGICAL ANATOMY** (the dissection and study of structures as modified by diseases). The origin of this branch of anatomy may be traced back to ancient times in Egypt; and amongst the Greeks some anatomico-pathological observations are found. During the general revival of science in the 16th century, many notices of pathological anatomy occur. Morgagni (1767) must, however, be regarded as the true founder of Pathological Anatomy. He was worthily followed by Lientaud, Sandifort, Hunter, Baillie, Meckel the younger, and others. The recent change of direction given to the study of Pathological Anatomy, which is now properly regarded as a means towards practical improvements in medicine, must be ascribed to Bichat and the pupils of Broussais, among whom may be mentioned the names of Latence, Cruveilhier, Louis, Andral, Lobstein, Lebert, Virchow, and Bennett.

Theoretical anatomy is divided into General and Special. **GENERAL ANATOMY** gives a description of the elementary tissues of which the systems and organs of the body are composed, as preliminary to an examination of them in their combined state in the various organs; it also investigates their laws of formation and combination, and the changes which they undergo in various stages of life. This branch of study may also be styled Structural or Analytical Anatomy, and has been first developed in recent times, especially by Bichat (1801) and Beclard, who have been followed by J. Müller, Goodsir, Henle, E. H. Weber, Schwann, Valentin, and many others. In our day, microscopic investigation has been successfully applied to the study of elementary textures. See **HISTOLOGY**.

SPECIAL ANATOMY (styled Descriptive by the French writers) treats of the several parts and organs of the body in respect to their form, structure, and systematic connection or relation with each other. The arrangement of the several parts and organs in an order deduced from their similarity in structure or use, constitutes **SYSTEMATIC ANATOMY**. According to this mode of study, which is essential as an introduction to physiology, anatomy has been divided, though not with scientific precision, into six branches of study. 1. *Osteology*, which treats of the bones, including the cartilages of the joints (chondrology). 2. *Arthrology*, which describes the ligaments, or bands, that unite the bones of various joints. The bones, with their cartilages and ligaments, form a framework, which supports the external soft parts, and within which the vital organs are suspended and protected from injury; they are also arranged in a mechanical system as organs of locomotion. 3. *Myology* explains the system of the muscles, which, by their contractile power, serve to impart motion to the bones and joints; while, like the bones, they contribute to form the cavities of the body, and to protect the internal organs. Their form also serves to produce the external shape and symmetry. 4. *Angiology* describes the vessels or ducts, with their complex network and ramifications, spreading over most parts of the body, and divided into two great systems: (a) the blood-vessels with the heart, a fleshy organ propelling the blood through the pulsating vessels or arteries, from which it returns to the heart, after circulation through the veins; (b) the lymphatics, by means of which a certain fluid (lymph) is passed through a series of organs named lymphatic glands, and afterwards enters the large veins at the root of the neck. The lacteals, which absorb the chyle from the intestine, also belong to this system of vessels. 5. *Neurology*, or the doctrine of the nerves, describes the nervous system, as divided into, first, the two central masses of the brain and the spinal

cord; second, the ramifications of nerves running from the brain and spinal cord to almost all points of the surface; and lastly, the order of nerves having a peculiar structure, and styled the ganglionic system of nerves. 6. *Splanchnology* describes the viscera or organs formed by combination of the distinct systems of veins, nerves, lymphatics, &c., and mostly situated in the cavities of the body. These are divided into five groups—viz.: (a) the organs of the senses—sight, hearing, smell, taste, and touch; (b) of voice and respiration—nostrils, mouth, larynx, trachea, and lungs, with the thyroid gland, the thymus gland, and the diaphragm; (c) digestive organs—the mouth, with its salivary glands, the throat, gullet, the stomach, the intestines, with the liver, spleen, and pancreas; (d) the urinary organs—kidneys, ureters, bladder, and urethra; (e) sexual organs of both sexes.

Special anatomy may be treated in another mode; by an arrangement made in accordance with natural divisions, or by imaginary lines dividing the body into several regions—as the head, the trunk, and the extremities. Again, the trunk may be subdivided into neck, thorax, and abdomen; and in each of the main regions, several subdivisions may be made. This system of arrangement may be styled Topographical Anatomy, and is also known as Surgical Anatomy, on account of its importance as the basis of operative surgery. It was the eldest of the Monros of Edinburgh University who first gave this branch of the study its due prominence.

COMPARATIVE ANATOMY, the investigation and comparison of the structures of two or more animals, has always preceded anthropotomy, or dissection of the human subject but was first treated systematically as a distinct science by Cuvier and his pupil Meckel the younger. Blumenbach, Tiedemann, Home, Blainville, Geoffroy St Hilaire, Cuvier, Oken, Goethe, Owen, Goodsir, Müller, Wagner, Siebold, Bowman, Todd, Milne-Edwards, von Baer, Gegenbaur, Kölliker, Remak, Czermak, Leydig, Frey, Schwann, Haeckel, Kowalevsky, Agassiz, Van Beneden, Burmeister, Carpenter, Allman, Sharpey, Allen Thomson, Huxley, Turner, and Flower, may be named as eminent contributors to this branch of science.

ANATOMY FOR ARTISTS is studied with reference to the effects produced by internal structure on the external form, and describes the organs, especially the muscles and tendons, not only in a state of rest, but also as modified by passion, action, and posture.

PRACTICAL ANATOMY includes *Dissection* (q.v.) and the making of *Preparations*. *Preparation* consists in dividing parts or organs, so that their respective forms and positions may be clearly shown. Organs or parts thus treated are styled *Anatomical Preparations* of bones, muscles, vessels, nerves, &c. For example, a bone-preparation is made by clearing away all muscular and other adhesions; the whole structure of the bone, thus prepared and bleached, when connected by wires in its natural order, forms an artificial *skeleton*. Preparations of the soft parts are either dried and varnished or preserved in spirit.

A series of such specimens, arranged in proper order, form an *Anatomical Museum*. The valuable collections made by Ruysch, Rau, Loder, Walter, John and William Hunter, Meckel, Sömmerring, Dupuytren, and Goodsir, are all now public property. As it is impossible to preserve thus all parts in their integrity for any great length of time, artificial copies in wood, ivory, papier-mâché, and wax are made with great exactitude. But, apart from dissections and preparations of the natural organs, the most general and available assistance in the study of anatomy is found in anatomical engravings and plates on wood and

copper. This assistance was known in ancient times. Aristotle alluded to his works on anatomy some anatomical drawings, which have been lost. In the 16th century the greatest artists—Leonardo da Vinci, Michael Angelo, Raphael, Titian, and Dürer—gave their aid in designing anatomical figures. Lately, lithography has been employed. See works by Langenbeck (1826), Arnold (1833, 5th ed. 1865), Meckel (1817-1826), Cruveilhier (1841), Froriep (1828), Hyrtl (16th ed. 1882), Malgaigne (1859); in Comparative Anatomy, Carus, Wagner, Cuvier, Gegenbaur, Milne Edwards, Owen, Huxley. Among English works may be mentioned those by Lizars, Jones, Cooper, Richard Quain, Ellis, and Ford, in *Special Anatomy*; by Morton and Machise, in *Surgical Anatomy*; and by Baillie and Bright in *Pathological Anatomy*.

The anatomy of the various parts and organs of the body will be found described, frequently in conjunction with their physiology, under their proper heads. Among the more important articles are the following:

Abdomen.	Epiderm.	Larynx.	Peritoneum.
Aorta.	Eye.	Leg.	Placenta.
Arm.	Foot.	Liver.	Respiratory
Arteries.	Foot.	Lungs.	Ribs.
Bile.	Glands.	Man.	Shoulder.
Blood.	Hair.	Membrane.	Skeleton.
Bone.	Hand.	Muscle.	Skin.
Braun.	Heart.	Nervous System.	Skull.
Capillaries.	Hip joint.	Nose.	Spinal Cord.
Cartilage.	Histology.	Œsophagus.	Spleen.
Cells.	Horn of	Ovaries.	Teeth.
Circulation.	Joint.	Palate.	Tongue.
Distension.	Kidney.	Pancreas.	Trachea.
Ear.	Knee-joint.	Pericardium.	Venus.

Anatomy, in Law. The difficulty of obtaining a sufficient supply of human bodies for dissection for purposes of surgical and medical instruction, gave rise, in the beginning of the 19th century, to the Resurrectionists (q.v.) and to the horrible crimes for which Burke was executed in 1828. This matter was accordingly made the subject of statutory legislation, and is now governed by the Anatomy Acts of 1832 and 1871. These Acts authorise the Home Secretary to grant licenses to practise anatomical dissection to any qualified medical practitioner, or any teacher or student of anatomy. A supervision of schools of anatomy is carried on by three inspectors (for England, Ireland, and Scotland), who make quarterly returns (unprinted) to the Home Office of the human subjects used in each district. In the absence of a contrary wish expressed by the deceased or a surviving relative, the

Act authorises an executor to submit the body of the deceased to dissection, but where the deceased has directed this to be done, the Act recognises the right of near relatives to object. Bodies are not to be removed for examination until forty-eight hours after death, nor without a certificate by the medical attendant, stating, according to the best of his knowledge or belief, the manner or cause of death. The person receiving the body must intimate the fact to the inspector, and must afterwards send to him a certificate of decent burial. The Act does not apply to any post-mortem examination of any human body required or directed to be made by any competent legal authority.

This system is understood to have met the evil it was designed to obviate; and under it the supply of bodies of person-dying friendless, in poor-houses, hospitals, and elsewhere, is stated to have proved sufficient for the wants of the profession.

Anaxagoras, one of the most eminent Ionic philosophers, was born at Clazomenæ, in Ionia, 500 B.C. He belonged to a wealthy family, but devoted himself exclusively to intellectual pursuits; and, still young, moved to Athens, where, in the course of a thirty years' sojourn, he acquired a high reputation, and had many illustrious pupils, among

whom were Pericles, Euripides, and possibly Socrates. But at last, his explanations of physical phenomena by natural causes rendered him suspicious to the polytheists; he opposed divination and astrology; and, being accused of impiety towards the gods, he was condemned to death. His sentence, however, was commuted into banishment for life, through the eloquence of Pericles. He withdrew to Lampsacus, on the Hellespont, where he died in 428.

It is not easy to ascertain what were the opinions of Anaxagoras in philosophy. Fragments merely of his works have been preserved, and even these are sometimes contradictory. Of one thing we are certain, that he had a deeper knowledge of physical laws than any of his predecessors or contemporaries. He also arrived at some tolerably accurate conclusions regarding the cause of the moon's light, of eclipses, earthquakes, meteors, of the rainbow, of wind, and of sound. His great contribution to ancient philosophy, however, was his doctrine as to the origin of all things. He held that all matter existed originally not in the form of the so-called elements, but in the condition of atoms; that these atoms, infinitely numerous and infinitesimally small, had existed from all eternity, and that order was first produced out of this infinite chaos of minutiae through the influence and operation of an eternal intelligence (Gr. *nous*). He also maintained that all bodies were simply aggregations of these atoms, and that a bar of gold, or iron, or copper was composed of inconceivably minute particles of the same material; but he did not allow that objects had taken their shape through accident or blind fate, but through the agency of this 'shaping-spirit' or *Nous*, which he described as infinite, self-potent, and unmixed with anything else. '*Nous*,' he again says, 'is the most pure and subtle of all things, and has all knowledge about all things, and infinite power.' His theory of the *Nous* was vague, but makes a great advance in the direction of theism, though personality is not attributed to the *Nous*. Anaxagoras marks a great turning-point in the history of speculation: while, on the one hand, his doctrine of the *Nous* passed to Aristotle, his doctrine of atoms prepared the way for Democritus (q.v.) and the Atomic School. With Anaxagoras, too, philosophy left its old home in Ionia, and established itself in its most famous seat in Athens. His most notable work, *On Nature*, has survived only in fragments, edited by Schaubach (1827), and by Schorn (1829).

Anaximander, a Greek mathematician and philosopher, successor of Thales as head of the physical school of philosophy, was born at Miletus, 611 B.C., and died in 547. He is said to have discovered the obliquity of the ecliptic, and he certainly taught it. He appears to have applied the *gnomon*, or style set on a horizontal plane, to determine the solstices and equinoxes. The invention of geographical maps is also ascribed to him. As a philosopher, he speculated on the origin (*archê*) of the phenomenal world, and this principle he held to be the infinite or indeterminate (*to apeiron*). From it he conceived all opposites, such as hot and cold, dry and moist, to proceed through a perpetual motion, and to return to it again. Of the manner in which he imagined these opposites to be formed, and of his hypothesis concerning the formation of the heavenly bodies from them, we have no sufficient information. Some of his particular opinions were, that the sun is in the highest region of the heavens, is in circumference twenty-eight times greater than the earth, and resembles a cylinder from which flow continual streams of fire; also that the earth is of the form of a cylinder, that it floats in the midst of the universe, and that it was formed by the drying up of moisture by the sun.

Anaximenes, a Greek philosopher of the Ionic school, was born at Miletus, and died about 500 B.C. He held *air* to be the first cause of all things, or the primary form of matter, whence all things were formed by compression.

Aubury is a disease in the turnip, which is produced by a fungus *Plasmiodophora*, belonging to the family of slime-fungi, *Myxomycetes*. It attacks the plant most readily when its full vigour is restricted by some unfavourable condition of growth—such as, when planted too frequently on the same land; when the soil is deficient in some necessary ingredient; or when it is in an unsuitable mechanical condition, the result frequently of improper or unseasonable cultivation. It is identical with club-root in cabbages, but is quite distinct from *finger-and-toe* in turnips, with which it is very frequently confounded. *Finger-and-toe* (*dietylorhiza*) is more a degeneration of the plant than disease; the bulb branching out into a number of tap-roots, while the skin remains smooth and unbroken. Both affections may exist on the same plant, and both cause the failure of the crop; but *aubury* differs from *finger-and-toe* in producing a scabbed and broken condition of the skin, and tubercular growths or enlargements on the roots and at the base of the bulb. In some cases maggots are found in the affected parts, but they are only attracted by the degenerate structure, and have nothing to do with the disease. It is accompanied with an offensive smell, resulting from the decay of the injured parts. *Aubury* may be noticed at a distance by the drooping and unhealthy appearance of the leaves during sunshine. There is no cure, but preventive means may be successfully employed; such as planting turnips on the same land only after long intervals; avoiding treading of the land while wet; working the soil and planting good seed at the proper season; applying manures sufficient to make good the soil's deficiencies; avoiding the consumption by cattle of roots on land which is soon to grow turnips; also dressing land with lime or gas-lime while preparing it for the turnip crop. The first dressing is not always efficacious, but a second application at the same period of the rotation when it comes round again is usually successful. The workings of the disease are yet so far mysterious: although the fungus is known, the actual conditions which encourage its development are not fully understood. For instance, in some districts (parts of Gloucester, and East Barns, Dunbar) turnips can be grown year after year on the same land, and yet not take the disease; while in other places (light soils particularly), to repeat the crop oftener than once in five or six years is most dangerous.

Ancelet, JACQUES ABBÉ POLYCARPE-FRANÇOIS, a French dramatic poet, was born at Havre, February 9, 1794. His first success was the tragedy of *Louis XV.* (1819), which procured him the post of librarian at the Arsenal, and a pension from the king. In 1826 he accompanied Marshal Marmont to St Petersburg, and published next year his *Sir Moïse en Russie*, part in verse, and the novel, *L'Honnête du Monde*. After the revolution of July had deprived him of his place and pension, he brought out upon the stage a succession of light comedies and vaudevilles, most of which had but little merit. His tragedy *Maria Padilla* opened to him, in 1841, the doors of the French Academy. Shortly after appeared his *Epîtres Familiales*, distinguished by point and elegance. He died 7th September 1854.

Ancestors. WORSHIP OF, the chief element in the religions of perhaps the larger half of mankind at the present moment. It arises naturally from the primitive conception of a soul during life animating

the body and exercising influence over it, and after death merely retaining its power, continuing into the unseen world the life and social relations of the living world. The dead chief now passes into a deity, goes on protecting his clan and receiving service from them, and continues to keep the same temper as in mortal life. So that it is not mere family affection, but actual fear, that impels this reverence among the North American Indians, the ancient Aztecs, the negroes in Guinea, the natives of Polynesia, and most strongly among the Zulus, who conquer in battle with the help of the 'amatongo,' the spirits of their ancestors, and reach back through a series of divine ancestors to the earliest ancestor and creator of man, the Old-old-one, Unkulunkulu. The primitive mind, it would seem, makes no essential distinction between the divine nature, the human nature, and the animal nature, and freely worships visible natural objects for the sake of the spirits resident in them. The conception is due to Animism (q.v.), and develops into a more spiritual point of view, in which the indwelling spirit is considered as having an independent existence detached from the object with which it was confounded. Thus arise those refinements of primitive religion called sorcery, fetichism, and idolatry. Sorcery is the parent of sacerdotalism; fetichism leads naturally to its æsthetic development, idolatry.

The worship of ancestors is really a subdivision of animism. The spirits of the dead are assimilated to the spirits that reside in the objects of nature, at first revered like them, then more than them. Where direct worship of the objects of nature unfolds itself into a rich dramatised mythology, that is to say among the races most endowed with the speculative and æsthetic faculties, such as the ancient Greeks, animism and the worship of ancestors develop but feebly. But where on the contrary, as in China, mythology remains infertile; or where, as among many savage races, it never gets beyond its embryonic stage, animism becomes preponderant, and often, by it and along with it, the worship of ancestors. In China it is the dominant religion. Ancestors still have their temples and their offerings, and remain so present that the virtues or the crimes of their descendants are always considered in relation to them, as covering them with honour or infamy. The Hindû pays his offerings to the *pitris* (*patres*) or divine manes, and looks to them for success and happiness. In Europe, the most conspicuous example was the usage of the ancient Romans. Their *manes* or ancestral deities were embodied as images, set up as household patrons, and appeased with offerings. They were counted among the gods of the lower world, and tombs were inscribed D.M., 'Dis Manibus,' sometimes seen as a strange survival in Christian epitaphs. And in the crowd of saints in modern Christendom, with specialised functions, deemed capable of interfering to help the spiritual interests of their votaries, we see at least with what marvellous tact new ideas were fitted to the old.

The universality of ancestor-worship has led Herbert Spencer to the opinion, that it was the origin of religion everywhere. His view is a kind of revival of the old Euhemerism (q.v.), which explained the myth as containing an element of historical truth, its figures as enlarged portraits of real men and women, and its gods as merely ancestral ghosts raised to a higher power. He argues that all religious beliefs arose originally out of the erroneous conclusions drawn by primitive man from the ill-understood facts of his own nature, especially in the phenomena of sleep and dreams. These have to the savage as much objective reality as those he has seen when awake. This primi-

tive conception finds further support in the facts of syncope, apoplexy, catalepsy, and other forms of temporary insensibility. During these his 'double,' the soul, has, he believes, been actually absent from the body. These ideas applied to death—but a lengthened sleep or prolonged absence—have engendered the idea of an awaking following regularly after death. Hence primitive funeral rites assume that the dead can eat, drink, and fight anew, and act in everything like a living man. Upon this conception of the state of the dead, in Spencer's view, the savage man's idea of another life is grafted, confirmed as its reality is by the apparition of the dead in dreams. A future life assumes another world—a region of souls, located at first near the place of burial, afterwards above, below, and around the living world. These disembodied souls constantly increasing in number are ordinarily invisible, but are able to manifest themselves from time to time, and to particular individuals. Hence arises naturally the idea that things astonishing, extraordinary, or exceptional, have for their causes the action of the dead spirits—invisible, and in one sense supernatural agents. Since these disembodied spirits still continue influential for good or evil, it is wise to conduct ourselves in such a way as to conciliate their good-will and to deprecate their wrath.

In this elemental consideration, says Herbert Spencer, is the foundation of all religion. But his argument fails to account for many of the facts, and at the outset its fundamental negation may be questioned, that primitive man is incapable of an illusion which consists in taking the inanimate and impersonal for the animate and the personal. He forgets that savage man is full of imagination, and that he is constantly personifying. In fact, personification remains long after the primitive stage is past. In the Græco-Roman society it was the last impress of the old polytheism, and the stars were still animate beings to the eyes of the Stoics and Alexandrians, to a Jew like Philo, and a Christian like Origen. Mr Spencer's theory does not explain the parallelisms and analogies between myths among races of the most widely different degree of civilisation, nor the difference in the degree of divinity between the first and later ancestors, nor why the dead man has more power for good or evil than he had when alive. His opponents assert that he has not wandered far enough afield for his facts, and that the luminous and convincing appearance of his argument is merely due to the systematic selection of such facts as seem to confirm it, and the no less systematic elimination of their contraries. Certainly the problem of the origin of religion is a much more complex question than this, and ancestor worship is merely a phase of an infinitely wider question. See Tylor's *Primitive Culture* (1871); Herbert Spencer's *Principles of Sociology*; Caspari, *Die Urgeschichte der Menschheit* (1877); and Albert Réville, 'La Nouvelle Théorie Euhémériste,' in *Revue de l'Histoire des Religions* (vol. iv. 1881).

Anchortherium, a noteworthy animal that lived in Europe and North America during Upper Eocene times. It had affinities to the tapir-like *Palæotherium* (q.v.) and true horse. Each foot had three hoofs, the middle one being the largest, and all reached to the ground. The anchortherium was about the size of a small pony, and is looked upon as one of the ancestors of the existing horse.

Anchor, an implement for retaining a ship in a particular spot, by temporarily chaining it to the bed of a sea or river. Many forms of anchor were made by the ancients; some were merely large

stones; others, crooked pieces of wood, weighted to make them sink in water, the earlier ones acting mainly as weights, and holding the vessel by their own inertia instead of hooking into the ground. The first *iron* anchors are supposed to have been used by the Greeks. As originally made, the anchor had only one fluke or arm for penetrating the ground, and no stock. A large-sized modern anchor, irrespective of recent improvements, comprises the following parts (see fig. 1): The vertical or supporting beam of the anchor is the *shank*, *B*; at the upper end of it is a *ring*, *r*, or a shackle, and just below the ring is a transverse piece called the *stock*, *s s*; the other extremity is the *crown*, *c*, from which branch out two *arms* or *blades*, *g*, in directions nearly at right angles to that of the stock; each arm spreads out into a broad *palm* or *fluke*, *h*, the sharp extremity of which is the *peak* or *bitt*, *l*. When the anchor is let go from the ship's side, the crown first strikes the ground; it then falls over in such a manner that one end of the stock rests upon the ground; and the subsequent

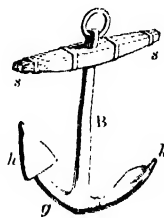


Fig. 1.—Anchor of Admiralty Pattern.

movements of the ship and the cable cause one or other of the flukes to enter the ground, and take fast hold.

The number of anchors in British ships-of-war varies according to the size of vessel, and the character of the service intended. A large ironclad carries 8 anchors—2 'bowers,' 2 'sheets,' 1 'stream,' 1 'stern,' and 2 'kedges.' Smaller vessels have fewer and smaller anchors; and the 'stream'-anchor of a large ship may conveniently serve as the 'bower' for a smaller, the difference between bower, sheet, and spare anchors being rather in size than in design. Lloyd's rules prescribe the number and weight of anchors which must be carried by ships of different sizes registered in their list, as well as the size and length of their cables, hawsers, and warps.

Some of these particulars are given in the table:

Ship's Tonnage.	Anchors.				Steel-Chain Cables.		
	No. of Bowers.	No. of Others.	Weight of each Bower.	Admiralty Test.	Size of Cable in inches.	Length in fath.	Actual Test in tons.
100	2	2	5	7½	4½	155	111
200	3	2	8½	10½	1½	165	20½
500	3	3	18	19	1½	249	37½
1000	3	3	39	28½	1½	270	55½
1400	3	3	31	31½	1½	270	63½
2000	3	3	40	35½	2½	270	76½
2500	3	3	42	37½	2½	300	86½
3000	3	3	45	39½	2½	300	96½

Excluding stock.

Steamers are only required to carry the anchors and cables which belong to a sailing-vessel of two-thirds their total tonnage.

Many improvements in the shape and construction of anchors of the standard type have been introduced during the past forty or fifty years, of which Rodgers' and Lenox's anchors are the best known; and latterly several novel and improved forms have received extensive adoption—especially in vessels for merchant service. One of the most important changes is that effected under Rodgers' patent of 1838, also known as Honibal's. The arms, instead of being solidly connected to the shank, are movable in relation to it. They pivot about a bolt passing through the crown-piece of the arms and the end of the shank, the latter being fork-shaped to receive the former. The principle will be understood from fig. 2, repre-

senting an early form of Trotman's anchor, which is an improved modification of Porter's, the difference mainly consisting in the shape and disposition of the flukes and their horns or toggles. The advantages of this anchor over those of ordinary make are very considerable. Besides the increased holding-power due to the pivoting of the arm, and diminished chance of the anchor lodging on its stock end, there is less danger of its 'fouling' in other words, of the cable becoming entangled with the upper fluke because of the reduced height that the fluke projects above ground when the lower one

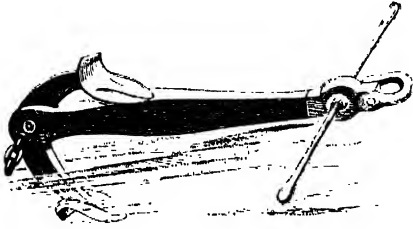


Fig. 2.—Trotman's Anchor at Work.

has taken hold. The construction of the anchor is of course more complex than the ordinary solid anchor, and its peculiar form makes it somewhat awkward to 'fish,' and still more difficult to 'sweep,' in the event of the cable parting. On the other hand, it is very conveniently stowed on ship-board. In 1852 the Admiralty appointed a committee to make an elaborate trial of a large number of anchors; and that which obtained the highest place was Trotman's.

An anchor radically different is that patented by Martin, a Frenchman. It is self-canting, and both flukes are utilised at one operation for maintaining a hold of the ground. The arms, which are in one piece, are fitted through a hole in the crown end of the shank, which is increased in area for the purpose, and they are free to swing through a range of 30° relatively to the shank. Thus, on whatever side the anchor falls, the arms by their own weight and the pull of the cable are made to take hold of the ground at once. The stock, which is flat and broad, is fitted across the shank in the same direction as the arms. This anchor is simple in construction, being made in three separate forgings, without a weld, and is easily housed. The Admiralty—who favour this

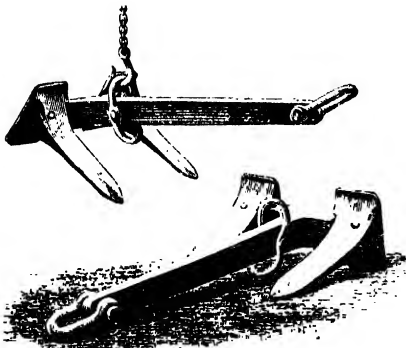


Fig. 3.—Smith's Stockless Anchor.

anchor for special types of vessels allow a reduction of 25 per cent. in weight, using an 80-cwt. Martin's anchor (with stock) where a 90-cwt. (with

stock, 108 to 112 cwt.) Admiralty or Rodgers' anchor would be fitted.

Several anchors which appear to be modifications of Martin's have recently been introduced. One of these being pretty extensively adopted is Wastenay Smith's stockless anchor (shown by fig. 3). Like Martin's, it is self-canting, and both flukes take hold of the ground at once, no matter how the anchor falls. The stock being dispensed with, a large saving in weight is effected.

A recent innovation, for which anchors of the type just described readily adapt themselves, is the formation of a recess in the ship's side at the mouth of the hawse-pipes, in which to house the anchors instead of hoisting them on deck—an arrangement which offers very considerable advantages over the ordinary system.

Till the introduction of the steam-hammer, anchor-making was the most formidable smith's work, on account of the great size and weight of the pieces of iron. The anchor-smiths wielded the most ponderous sledge-hammers known to our artisans. An even greater recent change is that crucible cast-steel is now taking the place of wrought-iron for anchors. At some of the government dockyards, anchor-making is conducted on a great scale; but the larger portion of the supply for the navy is obtained by contract with private firms.

Anchorage is a due or toll levied on the owner or captain of a ship for permission to cast anchor at special anchoring-grounds. In most instances it is payable to the State; but sometimes the right is vested in corporate bodies or in individuals. Anchorage also signifies 'anchor-ground,' the best ground being stiff clay, and, next to it, a firm sand.

Anchor-ice, or **GROUND-ICE,** a kind of ice which forms upon the beds of rivers, or shallow brackish seas. It only begins to form when the temperature of the atmosphere falls to within 10° F., and it does not adhere strongly to the bottom until zero is reached. It is somewhat porous or sponge-like in appearance, and when it rises to the surface, it frequently brings with it the stones or boulders to which it is attached. It is where the flow of the water is most interrupted and tumultuous that this kind of ice forms most readily: it does not appear to form in perfectly still water, however clear. See ICE.

Anchorite. See HERMIT.

Ancho'vy (*Engraulis encrasicolus*), a small bony fish of the herring family (Clupeidae), of some importance as a food-luxury. It may attain a length of eight inches, but usually measures only about a finger's length. The snout of the pointed head projects considerably beyond the lower jaw, the abdomen and sides are covered with large silvery scales, the back has a greenish-blue colour, the tail is deeply forked. The species occurs



Anchovy.

abundantly round the European coasts, especially in the southern and Mediterranean region, while the genus is represented in all the warmer waters. It would seem to have been formerly more abundant in the British seas, as several acts of parliament in the reign of William and Mary regulated the anchovy fisheries. It seems, however, that the

fishery, rather than the supply of fish, has declined. In spring, shoals of anchovies leave the deep seas and approach the shore for spawning purposes. They are fished at night; attracted by lights, and captured by the seine net. They are salted, and used for sauces, &c. Three species are found in North American Atlantic waters, and four on the Pacific side. The Romans seem to have used them for the esteemed fish sauce called *garum*, and the Indian species (*E. brownii*) is used for making the condiment called Red Fish.

Anchovy Pear (*Grisea cauliflora*), a tree, the only known species of a genus somewhat doubtfully referred by Lindley to his order Barringtoniaceæ (now regarded as a sub-order of Myrtaceæ). It grows in boggy places in the mountainous districts of Jamaica and other West Indian islands, attains a height of 50 feet, and has great oblong leaves 2 or 3 feet in length. This fruit is pickled and eaten like the East Indian mango, which it much resembles in taste.

Anchusa. See ALKANET.

Anchylosis. See ANKYLOSIS.

Ancillon, JOHN FREDERICK, a member of a French family which, after the revocation of the Edict of Nantes, migrated into Prussia, was born in Berlin, in 1767. Originally pastor of the French refugees, he was in 1792 appointed professor of History in the Military Academy of Berlin, and afterwards tutor to the crown-prince, having become known for his great work, *Révolutions du Système Politique de l'Europe* (4 vols. 1803-5). In 1814 and 1818 he held administrative posts, and in 1832 became minister of foreign affairs. He died in 1837, and left numerous writings on politics, philosophy, and literature.

Ancona, the capital of a province in Italy, of the same name, is situated on a promontory of the Adriatic coast, rising in the form of an amphitheatre from the sea, 127 miles S.E. of Ravenna by rail. It is the seat of a bishop, and contains (1881) 31,277 inhabitants, of whom above 2000 are Jews. Its harbour had become much silted up, but in 1887 was being improved and deepened; while plans had been adopted by government for new docks, an arsenal, and separate dry docks for the navy and mercantile marine. Its commerce is much less considerable than it once was, but it is still the most important seaport on the Adriatic between Venice and Brindisi. The manufactures are silk, ships' rigging, leather, tobacco, and soft soap; its exports (declining in recent years) are cream, tetter, lamb and goat skins, asphalt, bitumen, corn, hemp, coral, and silk. Since 1815, the old citadel was the only fortification until, recently, strong forts were erected on the neighbouring heights, and the citadel turned into a large dépôt for soldiers. A mole of 2000 feet in length, built by the Emperor Trajan, and a triumphal arch of the same emperor, are the most notable monuments of antiquity. One of the most venerable buildings is the cathedral of San Ciriaco, built in the 11th century, and possessing the oldest cupola in Italy. But the houses are in general mean, and the streets narrow. Ancona is supposed to have been founded about 380 B.C. by Syracusans, who had fled from the tyranny of Dionysius the Elder. It was destroyed by the Goths, rebuilt by Narses, and again destroyed by the Saracens in the 10th century. It afterwards became a republic; but in 1532 Pope Clement VII. annexed it to the States of the Church. In 1797 it was taken by the French; but in 1799 General Meunier was obliged to surrender it to the Russians and Austrians, after a long and gallant defence. In 1832 a French force took possession of the town and kept it in their hands till 1838,

when both French and Austrians retired from the Papal States. In 1849 a revolutionary garrison in Ancona capitulated after enduring a siege by the Austrians of 25 days. In 1861 the flag of the kingdom of Italy waved over the ancient city. — *The March of Ancona* was the name applied to the territory lying between the Adriatic and the Apennines, from Tronto N.W. to San Marino. Erected into an independent marquisate under the Longobards, the district was a papal dependency from the 13th century, but passed into the hands of Victor-Emmanuel in 1860.

Ancre, BARON DE L'ESSIGNY, MARSHAL D', originally Concino Concini, was a Florentine by birth, and came to the French court in 1600, in the train of Maria de' Medici, the wife of Henry IV. He married Leonore Galigan, one of the queen's women, and aided her in promoting the disagreement between the king and queen. After Henry's death, he became chief favourite and adviser of the queen-regent, and was raised to post after post of profit and honour, becoming at length marquis, and, in 1614, even marshal of France, though he had never seen war. His prodigality was immense, and he squandered enormous sums on the decoration of his palaces. Hated alike by nobility and populace, he was assassinated in the Louvre in open day, on the 24th of April 1617, the young king Louis XIII. himself being privy to the plot. His body was dragged by the mob through the streets, and burned before the statue of Henry IV. His wife was soon executed, on a charge of having practised witchcraft to gain influence over the queen.

Ancreum Moor, Roxburghshire, 5½ miles N.W. of Jedburgh, was in 1544 the scene of the defeat of 5000 English under Sir Ralph Evers and Sir Brian Latoun, by a Scottish force under the Earl of Angus and Scott of Buccleuch. A defaced monument marks the spot where a Scottish maiden, named Lilliard, is said to have done prodigies of valour.

Ancus Marcius, the fourth king of Rome, was the grandson of King Numa Pompilius. Following the example of Numa, he endeavoured to restore the almost forgotten worship of the gods and the cultivation of the arts of peace among the Romans. But, despite his inclination for peace, he became involved in several wars with the neighbouring Latin tribes, whom he subdued and reduced to order. He carried their inhabitants to Rome, and settled them on the Aventine. Against the Etruscans he fortified the Janiculum, connected it with Rome by a wooden bridge, and gained possession of both banks of the Tiber, as far as its mouth, where he founded Ostia as the port of Rome; and built the first Roman prison of which we read. He died in 616 B.C., after reigning twenty-four years.

Ancyra. See ANGORA.

Anda, a genus of Euphorbiaceæ, from the seeds of one of which, the *A. braziliensis*, a fine oil, highly purgative, is obtained.

Andalusia (Span. *Andalucía*), a large and fertile region occupying the south of Spain. Its shores are washed both by the Mediterranean and the Atlantic; and, though it is not now a political division of Spain, it is more frequently spoken of than the eight modern provinces into which it has been divided. The name is a form of *Vandalitia* or *Vandalusia*, from the Vandals, who overran it in the 5th century. When it was a Phœnician trade emporium, it was called Tartessus (probably the *Tarshish* of the Bible); the Romans named it Bætica, from the river Bætis, the modern Guadalquivir. In the 8th century, the Moors founded

here a splendid monarchy, which quickly attained a high degree of civilisation. The four great Moorish capitals were Seville, Cordova, Jaen, and Granada. During the darkness of the middle ages, Cordova was 'the Athens of the west, the seat of arts and sciences.' The Moorish kingdoms were finally conquered by the Castilians in 1235-48. Christian intolerance seriously and permanently impoverished the country; but later, under the Spaniards, painting here arose in a new form in the schools of Velasquez and Murillo. Andalusia mainly consists of the great basin of the Guadalquivir, and the mountainous districts which bound it. In the south, the Sierra Nevada attains a height of 11,657 feet. Andalusia was called the garden and the granary of Spain; but now such names are merited only by portions of the country on both sides of the Guadalquivir, where, even with careless cultivation, the soil is luxuriantly productive, and vegetation generally assumes a tropical character. Cotton and sugar-cane flourish in the open air, and the cactus and aloe form impenetrable hedges. Wine and oil abound; but some tracts are very barren, especially in the west, owing to deficiency of water. On the whole, however, Andalusia is still one of the most fertile districts of Spain, owing to its delicious southern climate and the abundance of water supplied by its snowy mountains. Its breeds of horses and mules have long been celebrated. The mountains yield silver, copper, lead, iron, and coal; and some ores are extensively worked. The Andalusians are lively, imaginative, and active, but boastful, unwarlike, and superstitious. They speak a dialect of Spanish manifestly tinged with traces of Arabic. Andalusia is divided into the provinces of Almeria, Jaen, Malaga, Cadiz, Huelva, Seville, Cordova, and Granada. The chief towns are Seville, Cordova, Jaen, and Cadiz (q.v.). Area, 33,340 sq. m. Pop. (1881) 3,370,089.

Andalusite, a mineral consisting of silicate of alumina, occurs in slightly rhombic, four-sided prisms, and also in a massive form; pearl-gray or reddish in colour. It is met with not infrequently as a constituent of certain metamorphic rocks, as *Andalusite-slate*. A variety of andalusite is known as *chiastolite* (Gr. *chiastos*, 'decessated'). The crystals of this variety, when broken across, often show cruciform or tessellated patterns. They are common in certain andalusites.

Andamans, a group of thickly wooded islands towards the east side of the Bay of Bengal, about 680 miles S. of the Hooghly mouth of the Ganges, between 10 and 14° of N. lat., and 92 and 94° of E. long. They consist of the Great and Little Andaman groups, surrounded by many smaller islands. The Great Andaman group is more than 150 miles long and 20 miles broad, and comprises four islands, the North, Middle, and South Andaman, and Rutland Island. The Little Andaman, which lies about 30 miles S. of the larger group, is 28 miles long by 17 miles broad. The total area is 2508 sq. m. The native inhabitants stand in the lowest stage of civilisation, and belong to the same family as the original small-statured races in Southern India; their number in Great Andaman is about 2000; in Little Andaman, from 1000 to 1500. Those that have come into contact with the convicts here have deteriorated morally. Their height seldom reaches five feet; their complexion is very dark, the hair crisp and woolly. The men go naked; the women wear round the loins a girdle of leaves. They have no settled dwellings, but go freely from island to island, and subsist on the fruits and beasts of the wood, and upon fish. A British settlement was made on North Andaman in 1789, but abandoned in 1796 for Penang. The capital of the present settlement is at Port Blair,

on South Andaman, the largest island of the group. The harbour here is one of the finest in the world. Since 1858, the Andamans have been a penal settlement for sepoy mutineers and other life-convicts. In 1881 the population of the convict colony was 14,628, of whom 1988 were women. In 1872 Lord Mayo, viceroy of India, was assassinated at Hoptown on Viper Island by a Mussulman convict.

Andante (Italian), in Music, implies a movement somewhat slow and sedate, but in a gentle and soothing style. This term is often modified, both as to time and style, by the addition of other words—as *Andante affettuoso*, slow, but pathetically; *Andante cantabile*, slow, but in a singing style; *Andante con moto*, slow, but with emotion; *Andante grazioso*, slow, but gracefully; *Andante maestoso*, slow, with majesty; *Andante non troppo*, slow, but not too much so; *Andante pastorale*, slow, and with pastoral simplicity. See ADAGIO, SYMPHONY.

Andelys, LES, a town in the Norman department of Eure, France, consisting of Great and Little Andelys, situated less than a mile apart, and about 20 miles N.E. of Evreux. Great Andelys has a Gothic church of the 13th century, with fine painted glass. Little Andelys, close by the Seine, stands below the castle rock of Chateau Gaillard, a castle built by Richard Cœur de Lion to command the Seine, and taken and retaken during the old wars between England and France. Pop. (1881) 3883.

Andenne, a town of Belgium, 12 miles E. of Namur by rail. It has manufactures of paper, porcelain, and tobacco-pipes, and there are beds of pipe-clay and coal-mines in the neighbourhood. Pop. (1883) 7503.

Anderab, or ANDERAB, a town in Afghan Turkestan, on the northern slope of the Hindu Kush Mountains, 80 miles S.S.E. of Kunduz. It is an entrepôt of commerce between Persia and India. Pop. 6500.

Andermatt, or URSEREN, a Swiss village in the canton of Uri, about 18 miles S. of the Lake of Lucerne. As it is at the crossing of the St Gothard road and that over the Finca Pass, it has long been famous both as a tourist centre, and for a considerable transit trade. The St Gothard railway does not touch the village. Pop. 750.

Andernach, a little town belonging to the district of Coblenz on the Rhine, was once a Roman fortress styled *Atrannacum*, then a residence of the Merovingian kings, and afterwards became one of the most flourishing places on the Rhine. The great tower on the north side, the fine old church—partly built in the Carolingian times—the old gate, the ruins of the great castle of the Archbishops of Cologne, and other relics of antiquity, give quite a mediæval aspect to the town. It now contains (1885) 7781 people; and is celebrated for its millstones and for cement made of its tufa rock or tress.

Andersen, HANS CHRISTIAN, one of the great story-tellers of the world, the most widely popular of Danish authors, was born April 2, 1805, at Odensee in Fünen. The son of a poor shoemaker, after his father's death he worked for some time in a factory, but his wonderful singing and extraordinary talent soon procured him friends and patrons, of whom the earliest was Madame Bunkeflod, widow of a poet of some reputation. He early displayed a talent for poetry, and was known in his native place as 'the comedy writer.' Hoping to obtain an engagement in the theatre, he found his way to Copenhagen, but was rejected for his lack of education. He next tried to become a singer, but soon found that his physical qualities were quite unfitted for the stage. Generous friends,

however, helped him in his distress; and application having been made by one of them to the king, he was placed at an advanced school at the public expense, and so enabled to get the better of the defects of his education. Some of his poems, particularly the one entitled *The Dying Child*, had already been favourably received, and he now became better known by the publication of his *Walk to Amak*, a literary satire in the form of a humorous narrative. In 1830 he published the first collected volume of his *Poems*, and in 1831 a second, under the title of *Fantasies and Sketches*. Spite of his genius and industry he failed to please the critics, and his genial egotism made him an easy butt for their clumsy ridicule. A travelling pension granted him by the king in 1833 removed him from his miseries, and supplied what was needful for his mental development. Some of its fruits were his *Travelling Sketches* of a tour in the north of Germany *Agnes and the Mermaid*, completed in Switzerland; and *The Improvisatore*, a series of scenes depicted in a glowing style, and full of poetic interest, inspired by the genial atmosphere of Rome and Naples. The public opinion, not of Denmark alone, but of Europe, asserted itself about the merits of the last of these books, and henceforth its author was safe from the critics. Soon afterwards, he produced *O.T.* (1836), a novel containing vivid pictures of northern scenery and manners, which was followed (1837) by another, entitled *Only a Fiddler*. In 1840 he produced a romantic drama entitled *The Malatto*, which was well received; but another drama, *Raphaella*, was less successful. In the same year appeared his *Picture-book without Pictures*, a series of the most imaginative sketches. In the end of 1840 he commenced a somewhat lengthened tour in Italy and the East, of which he gave an account in *A Poet's Bazaar* (1842). In 1844 Andersen visited the court of Denmark by special invitation, and in the following year he received an annuity. After that time he travelled much, visiting England as well as other countries. Among other works of Andersen are *The Story of My Life* (1855); *New Tales and Adventures* (1858-61); *Tales from Jutland* (1859); *The Sandhills of Jutland* (1860); *Tales for Children* (1861); *The Wild Swans*, and *The Ice Maiden* (1863).

His fame has long been more than European. His *Dying Child* has been translated into the language of Greenland; and on his seventieth birthday he was presented with a book containing one of his tales in fifteen languages. On the same occasion the king of Denmark gave him the Grand Cross of the Dannebrog Order. He died at Copenhagen, August 6, 1875. In his autobiography, Andersen has told the story of his life with all his peculiar charm. Most of his tales, moreover, were suggested by the incidents of his own life. Even his most fantastic stories have usually a background of actual experience, and perhaps to this is due, in no small degree, their most abiding charm—the perfectly naive and inimitable sense of reality and truth, even in incidents quite out of the world of the ordinary and the natural. Their prevailing tenderness was the echo of his own emotions. His heavy face and ungainly form hid a heart that overflowed with love for all lovely things. The darling of children in his lifetime, he has secured himself the happiest as well as the surest immortality in the place nearest the heart of the children of the civilised world.

Anderson, Elizabeth Garrett, was born in London in 1837, and brought up chiefly at Aldborough, Suffolk. In 1860 she studied medicine with much credit at the Middlesex Hospital; but a petition from the students against the admission of women prevented her return. Miss Garrett ex-

perienced considerable difficulty in qualifying, but in 1865 she passed the Apothecaries' Hall examination with credit, and the next year received her first dispensary appointment. In 1870 she was made a visiting physician to the East London Hospital, and headed the poll in the election for the London School Board. In this year, also, the university of Paris conferred on her the degree of M.D. Since her marriage to Mr Anderson in 1871, she has practised regularly as a physician for women and children. She has written several papers on professional and social subjects.

Anderson, James, antiquary, was born at Edinburgh in 1662, and admitted a W.S. in 1691. In 1705, two years before the Union, he published a treatise vindicating the independence of Scotland, and impugning Harding's forged charters; thenceforward, to the close of his unhappy life, he was constantly employed on his *Selectus Diplomatum et Numismatum Scotie Thesaurus*. He died in 1728, having just completed his *magnum opus*, which did not appear, however, till 1739.

Anderson, James, a writer on political economy and agriculture, was born in 1739, at Hermiston, near Edinburgh; and while managing the family farm, he attended chemistry classes. He invented the small two horse plough without wheels, commonly called the Scotch plough. When only twenty-four years of age, he rented a large farm in Aberdeenshire, where he wrote a series of essays upon agriculture; and in 1780, the university of Aberdeen bestowed on him the degree of LL.D. In Edinburgh he edited (1790-93) a periodical called *The Bee*; in 1797 he went to London, where he died in 1808. He greatly helped in promoting agriculture in Scotland; and in an essay in his *Recreations of Agriculture*, he anticipated some important principles subsequently advocated by Malthus and Ricardo, particularly the famous theory of rent.

Anderson, John, founder of the college in Glasgow bearing his name, was born in the parish of Roseneath, Dumbartonshire, in 1726. He studied at the university of Glasgow, in which he was for four years professor of Oriental Languages; in 1760 he was transferred to the chair of Natural Philosophy. In addition to his usual class in physics, he instituted one for artisans, which he continued to teach to the end of his life. In 1786 appeared his *Institutes of Physics*, which went through five editions in ten years. He invented a species of gun, the recoil of which was stopped by the condensation of common air within the body of the carriage; but having in vain endeavoured to attract the attention of the British government to it, he went to Paris in 1791, and presented his model to the National Convention. It was hung up in their hall, with the following inscription over it: 'The gift of Science to Liberty.' Afterwards, when the allied monarchial forces had drawn a military cordon around the frontiers of France, Anderson ingeniously suggested the expedient, which was adopted, of making small balloons of paper, to which newspapers and manifestoes might be tied, and so carried to Germany. Anderson died in 1796, and by his will he directed that the whole of his effects, of every kind, should be devoted to the establishment of an educational institution in Glasgow, for the use of the un-academical classes.

ANDERSON'S COLLEGE was originally intended to be a university of four colleges. The funds being inadequate to the proposed plan, the institution was opened with only a single course of lectures on Natural Philosophy and Chemistry, by Dr Thomas Garnett in 1796. In 1798 a professor of Mathematics and Geography was appointed. In 1799

Dr Birkbeck, the successor of Dr Garnett, commenced the system of giving a familiar exposition of mechanics and general science, and this was the origin of mechanics' institutes.

The institution gradually enlarged its sphere of instruction, till it came to have a staff of nearly 20 professors and lecturers. Courses of instruction are given in Physical and Medical Science and in Chemistry; there are also taught Mathematics, Latin, Greek, Hebrew, French, Music, &c. As a school of medicine, in particular, it possesses a high reputation. Between 1861 and 1870 the endowments were largely augmented by large benefactions from Mr Freeland, Mr Ewing, and Mr Young of Kelly. The college possesses a number of valuable bursaries.

Anderson. MARY, a distinguished actress, was born at Sacramento, California, July 28, 1859, of Catholic parentage, her father being a Confederate officer who lost his life in the civil war. She played for the first time at Louisville, in 1875, in the character of Juliet. Her success was marked and immediate, and during the following years she played with increasing popularity in the principal cities of the Union in various rôles. In 1883 she appeared at the Lyceum Theatre in London, and speedily became well known in England.

Andersonville, a village in Georgia, U.S., noted as having been the seat of a Confederate States military prison, which was notorious for unhealthfulness and for barbarity of discipline. Between February 15, 1864, and April 1865, 49,485 prisoners were received, of whom 12,926 died in that time of various diseases. Henry Wirz, the superintendent, was tried for injuring the health and destroying the lives of the soldiers confined here, was found guilty, and hanged, November 10, 1865. The long trenches where the soldiers were buried have since been laid out as a cemetery.

Andersson. KARL JOHAN, an African explorer, born in Sweden, in the province of Wernland, in 1827. In 1850 he joined Francis Galton in a journey to the territories of the Damaras and Ovampos, and in 1853-54 continued the exploration alone, publishing, on his return to England, *Lake Ngami, or Discoveries in South Africa* (Lond. 1856). In 1858 he explored the Okavango (*The Okavango River*, Lond. 1861), and in 1866 he set out, almost unattended, on an expedition to the Cuenca. He came within sight of the stream, but, weakened with dysentery, had to retrace his steps, and died on the homeward journey, July 5, 1867.

Andes, a lofty mountain system of South America, extending north and south along the Pacific coast of that continent, throughout its whole extent. Geographically, it may be regarded as an extension of the vast and complicated mountain-system of Western North America, although it is not distinctly connected with that system. As the Andean chain approaches the Isthmus of Darien, after having crossed the Atrato, it is represented by a low crest of serpentine, at one point only 130 feet high; and much of the Isthmus proper is even lower than that.

The mountains of the Fuegian Archipelago, south of the mainland of South America, must be held to belong to this system. Cape Horn or a detached island, is regarded as the most southerly point of the chain, which, however, may be said to extend to the rocky islets of Diego Ramirez, 69 miles SW. of the Cape. Without allowing for curves, the Andes extend some 4500 English miles. For about 1000 miles (south of Chiloé), the mountains not only reach the ocean, but in part stand in its waters, for the great Chonos Archipelago is only

an irregular double chain of mountains. Indeed some geographers hold that these islands for at least 300 miles north of Cape Horn, in reality represent the main chain of the Andes. The Patagonian portion of the system is much cut by steep ravines, sometimes partly filled with glaciers, and not seldom occupied by deep fjords, or arms of the sea. On the eastern slope in Patagonia lie vast masses of granite, porphyry, basalt, and lava; and on both sides of the ranges vegetation is luxuriant; extensive forests covering a large proportion of the surface. This is chiefly due to the excessive abundance of the rainfall, to which cause also must be ascribed the numerous and rather large sub-Andean lakes of Patagonia, and the swift and copious streams which water its wild and gloomy terraces for the ascent to the mountains is here by a step-like succession of steep rises. The Patagonian Andes cover a strip of land from 20 to 50 miles in breadth, and, as will be seen in the table given below, are not of great height.

Between lat. 42° and 24° S. the main chain of the Andes recedes from the sea-coast, leaving in Chili a tract of country nowhere exceeding 120 geographical miles in breadth. The mountains here reach a mean elevation of 11,830 feet; one of the peaks (Aconcagua) is the loftiest on the American continent. In this region, both to the north and to the south, there is but one main line of peaks; but between these two parts two high parallel ranges occur, having between them a relatively low plateau. A low parallel ridge of granite skirts the mountains to seaward. On the Argentine side a great number of buttress-like processes extend into the Pampas country, chiefly having a south-easterly direction, except to the northward, where they are numerous, and are nearly parallel with the main Andes. The Bolivian Andes occupy perhaps one-third of the area of the republic. They form a vast arid region of great elevation. The east and west Cordilleras of Bolivia inclose the land-locked plateau of the Desaguadero, 13,000 feet in height, and having an area of 30,000 sq. m. It has thus about the superficial extent of Iceland, and has been called 'the navel of South America.' In the vicinity are several much smaller land-locked basins of similar character; and near at hand are some of the loftiest of the Andean summits.

The Peruvian Andes present features of great interest. The maritime Cordillera overlooks the sea in a close succession of volcanic cones. Near lat. 10° S. the chain divides into the seaward Cordillera Negra, and the more eastward Cordillera Nevada, with a deep trough or ravine intervening. The central Cordillera of Peru is the chain which bounds the Titiaca basin on the west. No river, except the Marañon (Upper Amazon), cuts through its vast wall-like ridges. The eastern Andes of Peru lie between a high, cool, western valley and the hot and seething forest plains of the Amazonian basin. They form a magnificent succession of grand peaks, with only very local evidences of recent volcanic action. To the north they decline greatly in elevation. Here the grandest scenery of the Andes is to be witnessed. The lofty wildernesses of the high Peruvian Andes form a cold and wind-swept region known as the Puna, and are scarcely habitable. In the SW. of Ecuador the various ridges of the Andes coalesce, immediately to divide again into two main chains, both characterised by intense volcanic activity. Transverse ridges divide the intervening valley into three basins, that of Cuenca in the south, Ambato in the centre, and Quito (with its fine climate and productive soil) in the north. The Cuenca basin is 7800 feet in elevation, that of Ambato 8500, and that of Quito 9500 feet.

The Colombian Andes are disposed in three main lines. The maritime range runs north and ends at Cape Tiburon, on the coast of the Caribbean Sea. It declines greatly in height to the northward, and the same thing is true of the central range, which in the south, near the great *paramo* or tableland of Cruz Verde, are very lofty. The very lofty eastern range (Cordillera of Suma Paz) extends to the NE., and near the Venezuelan boundary it forks out into two chains, one of which forms the Goajira peninsula west of Lake Maracaibo, and the other becomes the main Venezuelan mountain-system. Near Caracas the mountains skirt the sea-coast. Only a few of the peaks of the Venezuelan Andes rise above the snow-line.

PLATEAUS

Of the numerous plateaus of the Andes system, one, Assuay, is at a height of 14,500 feet. That of Titicaca, the Collao, is 12,500 feet; f. Cruz Verde, 11,695 feet; of Pasco, 11,000 feet; of Quito, 9500 feet; of Bogota, 8958 feet.

HEIGHTS OF MOUNTAINS.

Mountains	Feet.
Mount Saruminto.....	6910
Mount Darwin.....	6490
Cape Horn.....	3000

Patagonian Andes:

Yantles.....	8030
Cocovado (Volcano).....	7510

Chilian Andes Proper:

Acocagua.....	22,427
Cerro del Morcedario.....	22,302
Tupungato.....	20,269

Bolivian Andes:

Guallerti.....	22,000
Sorata.....	21,290
Humani.....	21,150

Venezuelan Andes:

Humac.....	22,000
Humaduy.....	21,088
Aequipa.....	18,375

HEIGHTS OF MOUNTAINS.

Mountains	Feet.
Ecuadorian Andes:	
Chimborazo.....	20,517
Cotopaxi.....	19,550
Antisana.....	19,260
Cayambe.....	19,200
Colombian Andes:	
Corni.....	19,300
Tolima.....	18,314
Sierra Nevada de Santa Marta.....	17,500
Venezuelan Andes:	
Sierra de Merida.....	15,342

PASSES.

Of nine notable Chilian ones, the lowest (Planchon) is 11,455 feet high, the highest (Diana Ana), 14,770 feet. In the Bolivian Andes the passes of Potosi and Guallillas are respectively 14,320 and 14,380 feet. f. Peruvian passes, Jacahuanka is 15,135 feet, and Cutaranga, 16,196 feet high; while Assuay, in the Ecuadorian Andes, is 12,375 feet; and Quindin, in the Colombian Andes, is 11,500 feet high.

Geologically, the Andes are by no means a unity. It is certain that the elevation of the different parts must have occurred at various times. The great bulk of the mountain masses is composed of stratified rocks, largely made up of materials which were deposited at the sea-bottom. It is believed that as a whole the formative sediment must have accumulated on subsiding areas. Upheaval, denudation, and direct volcanic action have been the other leading factors in the building and shaping of the mountains. The mineral wealth is great and varied. Volcanic action is still very active in Ecuador, but less so in the other parts of the chain. The Chilian volcanoes are numerous, but are seldom very active. Earthquakes occur frequently all along the coast from Caracas to Chiloe. Gold, silver, copper, mercury, and other metals abound in nearly every part of the Andes. The silver product is still very large. Further details of the mining industries of the Andes are given under the names of the various countries traversed by the range.

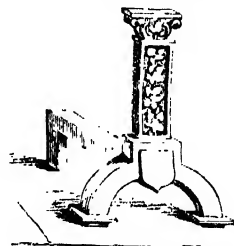
The effect of the Andes in drying the atmospheric currents that flow over them from the eastward, and the almost uniform desert character of most of the Pacific slope, are noticed in the article AMERICA. The awful cañons and chains of the Andes, the sublime height of their peaks, the difficult and dangerous character of the passes, the rich and varied vegetable life of the eastern slope, and the steep descent of the generally barren Pacific slope, all give elements of great interest to this great range.

Andesite, a group of volcanic rock, gray, reddish, or dark brown in colour. The ground-mass of these rocks is usually composed of felspar-microliths, scattered through which are abundant crystals of plagioclase felspar. Hornblende and

angite, one or both, are generally present, together with magnetite, which is often very abundant. Andesite occurs chiefly in Tertiary and more recent strata, and is found in Hungary, Transylvania, Siebengebirge, Santorin, Iceland, the Andes, the western territories of United States, &c.

And'ra, a genus of papilionaceous plants, one of which, the *A. inermis*, is known as the Cabbage Tree. This produces the Cabbage Bark, which is a strong anthelmintic.

Audiron (Old Fr. *audier*), a term frequently to be met with in inventories of the furniture of old houses, is more generally known as a fire-dog. Audirons were used for burning wood on an open hearth, and consisted of a horizontal bar raised on short supports, with an upright standard at one end. A pair were used, one standing at each side of the hearth, and the logs of wood rested across the horizontal bars. The upright portions of the audiron were of various forms; the design was frequently architectural, much ornamented with arabesques in silver or copper, and sometimes with the monograms of their possessors. Those for kitchen use had catches for holding the roasting apparatus.



Audiron.

Andkhui, a town and khanate in Afghan Turkestan. The town stands between the northern spurs of the Paropamisus and the Amu Daria (Oxus); it is due west of Balkh and on the edge of the desert. Down to the year 1840, it was subject to Bokhara. In that year, Mohammed Khan besieged it for four months, took it by storm, and left it a heap of ruins. To preserve himself from utter destruction, the khan threw himself into the arms of the Afghans. The tract in which it stands is fertile, but the place is proverbially unhealthy; the Persians account it 'a hell upon earth,' by reason of its scorching sands, brackish water, flies, and scorpions. The population is estimated at 15,000, consisting principally of Turkomans, with a mixture of Uzbeks and a few Tajiks. The khanate, though controlled by Kabul, has preserved some measure of independence.

Andorra, a valley in the Eastern Pyrenees, between the French department of Ariège and the Spanish province of Lerida, part of Catalonia. It is inclosed by mountains, through which its river, the Balira, breaks to join the Segre at Urgel; and its inaccessibility naturally fits it for being the seat of the interesting little republic which here holds a kind of semi-independent position between France and Spain. Area (divided into six communes), 175 sq. m. Pop. 6800 according to an actual numeration made by Bladé in 1875; but it has since been estimated by others as high as 15,000. The former abundant forests have been much thinned for fuel; there is much excellent pasture; vines and fruit-trees flourish on the lower grounds; and the mountains contain rich iron-mines, unwrought lead supplies, and mineral springs. The chief occupations are agriculture, cattle-breeding, trade in wood, charcoal, and wool, and especially smuggling. Andorra is said to have been declared a free state by Charlemagne. In 1278 the counts of Foix, afterwards kings of Navarre, obtained the sovereignty, reserving the rights of the Bishop of Urgel in Catalonia; and with Henry IV. the feudal superiority fell to France. Now the state stands under the common protectorate of France and of the Bishop of Urgel. The republic is governed

by a sovereign council of twenty-four members, chosen by certain heads of houses, and the council elects a president for four years, a syndic, under whom is a second syndic. There are two criminal judges called *viguier*s ('viciars'), of whom the first is appointed by France, and the second by the Bishop of Urgel. There is also a civil judge appointed by France and the Bishop of Urgel alternately, and there is an appeal from his judgment to the Court of Cassation at Paris, or to the Episcopal College at Urgel. In criminal cases, there is no appeal from the court of the republic itself. The revenue of the state is derived from lands and from some inconsiderable taxes. A sum of 960 francs is paid annually to France, and 425 francs to the Bishop of Urgel. Since 1882, the interests of France in the state are represented by a permanent delegate. The Andorrans are good-natured, hard-working mountaineers, hospitable, moral, and devoted to liberty. They are of the Catalanian stock, and speak a dialect of Catalanian. The capital is Andorra la Vieja (pop. 600); San Julian (500) and Canillo (500) are the other towns. See Berthet, *Le Val d'Andorre* (Paris, 1879).

Andover, a municipal borough and market-town of Hampshire, 66 miles SW. of London. Originally *Andrefortan* (passage of the river Ande), Andover dates from a remote antiquity, and received charters from Henry I., Richard I., and John. Till 1867 it returned two members to parliament; till 1885, one. The chief trade of Andover consists in corn and malt; there used to be manufactures of shalloons. At Weyhill, 3 miles to the west, an October fair is held, formerly one of the most important in England. The church of Andover, rebuilt in 1849, is in the Early English style. A Roman villa and other relics of antiquity have been discovered near Andover. Pop. (1881) 5654.

Andover, a village of Essex county, Massachusetts, 23 miles N. of Boston. Settled in 1643 from its English namesake, it is famous, even in Massachusetts, for its educational institutions. The Phillips Academy, instituted in 1780, is liberally constituted and well attended. The Andover Theological Seminary of the Congregationalists, an offshoot from it, was founded in 1807, for the purpose 'of providing for the church a learned, orthodox, and pious ministry.' Largely endowed, it offers free residence and instruction, and is frequented by students of various denominations. There is a valuable library of 30,000 volumes, and the *Bibliotheca Sacra*, a quarterly edited by the professors, is one of the leading theological organs of New England. The Abbot Female Academy, for the education of female teachers, and the Pynchard High School, are also flourishing institutions. Pop. of township (1889) 5169.

Andral, GABRIEL, a celebrated French physician and pathologist, born at Paris, 6th November 1797. In 1827 he was called to the chair of Hygiene, in 1830 to that of Pathology, in the university of Paris. He died February 13, 1876. Andral may be said to have been the first to apply an analytical and inductive method to pathology. His *Clinique Médicale* (1824) established his reputation, and his *Précis d'Anatomie et de Pathologie* (1829) was equally successful. His works of importance are his *Essai d'Hématologie Pathologique* (1843); *Cours de Pathologie Interne*; and *Recherches sur les Modifications de Proportion de quelques Principes du Sang*.

Andrassy, JULIUS, COUNT, a Hungarian statesman, was born at Zemplin, March 8, 1823. He was returned by his native town to the Presburg Diet of 1847, where he soon displayed oratorical and political powers of no mean order.

He threw himself heartily into the revolutionary movement of 1848, and on its defeat was exiled, retiring to France and England, until the general amnesty of 1857 enabled him to return to his own country. He was elected a member of the Hungarian Diet in 1860, where his support of the Deak party secured him the office of vice-president; and, on the reorganisation of the Austro-Hungarian empire in 1867, he was appointed prime-minister of Hungary. The chief event of his administration was the civil and political emancipation of the Jews. In 1871 Count Andrassy became minister for foreign affairs, and in 1878 ably represented Austria at the Congress of Berlin. In 1879 he retired from public life.

André, JOHN, an accomplished British officer, chiefly remembered for his connection with the treason of the colonial general, Benedict Arnold (q.v.), was born Copyright 1888 in U.S. by J. B. Lippincott Company. Benedict Arnold (q.v.), was born in London in 1751. His father was a merchant from Geneva, and his mother (*née* Girardot), though a native of London, was of French descent. Young André distinguished himself at the university of Geneva; but, on his father's death in 1769, he returned to London and assumed the management of the business. Finding mercantile pursuits irksome, however, he procured a commission, and in 1774 joined his regiment, the Royal Fusiliers, in Canada. He was captured at St John's by the colonial forces, was exchanged the following year, and became aide-de-camp successively to General Grey and Sir Henry Clinton, receiving from the latter (in 1780) the appointment of adjutant-general, with the rank of major.

During the occupancy of Philadelphia by the British army under General Howe in 1777-78, André was a welcome guest in the most aristocratic circles of that city, and was a recognised leader in their social festivities. He appears to have been particularly intimate in the family of Mr Edward Shippen, whose favourite daughter afterwards became the wife of General Benedict Arnold, and when in 1780 the latter obtained the command of West Point, André was selected by Clinton to consummate the arrangements with Arnold for the betrayal of that post. A meeting between the conspirators was agreed upon, and on the night of September 20, 1780, Major André embarked on board the sloop of war *Valtara*, and proceeded to the rendezvous, some 35 miles up the Hudson, near the hamlet of Haverstraw. The place of meeting was on neutral ground in a thicket near the bank of the river, and thither at midnight, after remaining on board the sloop all day, André was conducted by a trusty friend of Arnold, one Joshua H. Smith, a resident of the vicinity, to whom the object of the meeting was known. Failing to finish their business during the night, they repaired in the morning to Smith's house, within the American lines, whence, at the termination of their interview, Arnold departed for his headquarters, having first furnished André with a pass through the American lines (as Mr John Anderson), and papers containing the plan for the surrender of West Point. The fatal mistake of accepting and retaining these papers on his person was a direct disobedience to Clinton's instructions. Concealing the papers in his stockings, André, accompanied by Smith and a negro servant, set out on his return to New York; but Smith, fearing to attempt to get him on board the *Valtara*, decided that the journey must be made by land. They crossed the Hudson at King's Ferry, spent the night within the American lines, and parted in the morning, Smith to return home, and André, mounted on a horse, to pursue his dangerous journey alone. As André neared the British lines, he was halted by an armed band. He declared

himself a British officer on important business, and demanded permission to proceed. To his consternation his captors (one of whom wore a Hessian coat) proved to be ardent partisans of the colonists, and although André finally produced the pass given him by Arnold, their suspicions were so thoroughly aroused that they conducted him back within the American lines and delivered him to the military authorities.

The papers found upon his person clearly established his character as a spy, and a military board convened by Washington declared that 'agreeably to the laws and usages of nations he ought to suffer death.' Washington approved the finding of the board, and André was sentenced to be hanged. At the earnest solicitation of the British commander, the execution was stayed for a day on the plea that the board 'had not been rightly informed of all the circumstances;' but at an informal meeting with the president of the board he failed to adduce any sufficient reason for a commutation of the sentence, and André was accordingly hanged at Tappan-town, 2d October 1780. He was buried near the place of execution. A monument to his memory was erected in Westminster Abbey by order of the king, and thither his remains were conveyed and deposited in 1821.

See Sargent, *Life of Major André* (1861); Lossing, *The Two Spies—Nathan Hale and John André* (1886).

Andréä, JOHANN VALENTIN, a very original thinker and writer, born in 1586 near Tübingen. He studied at Tübingen, became a Protestant pastor, and died in 1654 at Stuttgart, where he was chaplain to the court. Eminently practical in mind, he was grieved to see the principles of Christianity made the subject of mere empty disputations, and devoted his whole life to correct this prevailing tendency of his age. His writings are remarkable for the wit and humour, as well as for the acuteness and moral power which they display. He was long regarded as the founder or restorer of the order of the Rosicrucians, a view based on his quaint but misunderstood *Chymische Hochzeit Christiani Rosenkreutz* (1616). But his intention was certainly not to originate or promote a secret society of mystics, but to ridicule the follies of the age, including the theosophic Rosicrucians. He wrote mainly in Latin, but also in the Swabian dialect. Among the best of his works are his *Menippus sive Satyrarum Dialogorum Liber* (1617), and his *Geistliche Kurzweil* (1619). See ROSICRUCIANS.

Andrea del Sarto. See SARTO.

Andreossy, ATOINE FRANÇOIS, COUNT, an eminent French general and statesman, was born on March 6, 1761, at Castelnaudary, in Languedoc. He entered the artillery in 1781, joined the Revolutionists, rose rapidly in military rank, served under Bonaparte in Italy and Egypt, and took part in the revolution of the 18th Brumaire. He served as ambassador at London, at Vienna, and at Constantinople, from which he was recalled at the Restoration. He was raised to the peerage by Napoleon after his return from Elba. After the battle of Waterloo, he advocated the recall of the Bourbons; but as deputy he generally took part with the opposition. He was elected to the Academy in 1826, and died at Montauban on September 10, 1828. He was a man of eminent scientific attainments, one of his earliest works being the *Histoire Générale du Ciel du Vidi*. Besides his scientific works, he wrote several military *Mémoires*.

Andrew, the first disciple and one of the apostles of Jesus. His career after the Master's death is unknown. Tradition tells us that, after

preaching the gospel in Scythia, Northern Greece, and Epirus, he suffered martyrdom on the cross at Patre in Achaia, 62 or 70 A.D. The anniversary of *St Andrew* falls on November 30. About 740 *St Andrew* became the patron saint of Scotland (see the article ST ANDREWS); and he is held in great veneration in Russia, as the apostle who, according to tradition, first preached the gospel in that country.

CROSS OF ST ANDREW.—A white saltire on a blue ground, to represent the x-shaped cross on which the patron saint of Scotland suffered martyrdom, has been from an early date adopted as the national banner of Scotland. It is combined with the crosses of *St George* and *St Patrick* in the Union Jack (q.v.). The Scottish Order of the Thistle (q.v.) is sometimes known as the Order of *St Andrew*.

THE RUSSIAN ORDER OF ST ANDREW is the highest in the empire, and was founded by Peter the Great in 1698. It has but one class, and is confined to members of the imperial family, princes, and persons of the rank of general who already hold two other important orders. The badge of the order shows on the obverse the double-headed eagle, crowned, on which is a *St Andrew's Cross* enamelled in blue, with a figure of the saint.

Andrew, JOHN ALBION, an American statesman, was born at Windham, Maine, in 1818, studied law, and was admitted to the bar at Boston in 1840. Distinguished for his opposition to slavery, he was elected a member of legislature by the republicans of Boston in 1858; in 1860 he became governor of Massachusetts, and was four times re-elected, retiring in 1866. He acquired great popularity by his attention to the wants of the soldiers in the field, for his fervid eloquence and patriotism during the war, and his zeal for the liberation and the arming of the negroes. He died October 1867.

Andrewes, LANCELOT, a great English prelate, was born at Barking in 1555, and educated successively at the Coopers' Free School in Ratcliffe, at Merchant Taylors' School, and at Pembroke Hall, Cambridge, of which college he was in 1576 elected fellow. Taking orders in 1580, he accompanied the Earl of Huntingdon to the north; and in 1589, through Walsingham's influence, he was appointed a prebendary of *St Paul's* and Master of Pembroke Hall. In 1597 Elizabeth made him a prebendary, and in 1601 dean of Westminster. He rose still higher in favour with King James, who was well qualified to appreciate his extensive learning and peculiar style of oratory. He attended the Hampton Court conference, as one of the ecclesiastical commissioners, and took part in the translation of the Bible. In 1605 he was consecrated Bishop of Chichester; in 1609 he was translated to Ely, and appointed a privy councillor, both for England and Scotland. To the latter country he accompanied the king in 1617, as one of the royal instruments for persuading the Scotch of the superiority of episcopacy over presbytery. In the following year he was translated to Winchester, where he died, 27th March 1626. A zealous High Churchman, Andrewes was, with the exception of Usher, the most learned English theologian of his time. As a preacher, he was regarded by his contemporaries as unrivalled; but the excellent qualities of his discourses are apt to suffer much depreciation in modern judgment from the extremely artificial and frigid character of the style. His principal works published during his life were two treatises in reply to Cardinal Bellarmine, in defence of the right of princes over ecclesiastical assemblies. His other works consist of sermons, lectures, and manuals of devotion; and the whole fill 8 vols. of the *Library of Anglo-Catholic Theology* (1841-54). See his *Life* by A. T. Russell (1863).

Andrews, THOMAS, physicist, was born in Belfast, 19th December 1813, and in the Queen's College there filled, from 1849 till 1879, the posts of professor of Chemistry and vice-president. His brilliant researches were of a physical than of a chemical nature, being on the heat of combination of various classes of substances, on the nature of ozone, and on the continuity of the liquid and gaseous states of matter. He was president of the British Association at Glasgow in 1876.

Andria is a city of South Italy, 30 miles W. of Bari. Its cathedral, a fine edifice, was founded in 1046. In 1799 the town was captured and burned by the French, after a stubborn resistance. The neighbouring country is famous for its almonds, which are a principal article of trade of the city. Majolica is made here. Pop. (1881) 36,795.

Andrieux, FRANÇOIS GUILLAUME JEAN STANISLAUS, a French scholar and dramatist, born at Strasburg, May 6, 1759. He began life as an advocate and promising politician, but his political career was cut short by Bonaparte, and he turned to literature as a calling. On the restoration in 1814, he was appointed to a chair in the Collège de France, was admitted to the Academy two years later, and made perpetual secretary in 1829. He died May 10, 1833. Of his many comedies, the best are *Les Étourdis* (1788) and *La Comédienne* (1816). He wrote also a tragedy, *Junius Brutus*, and numerous poems, full of grace and spirit, in the form of fables, tales, romances, and epistles.

Androclus, a Roman slave of the early part of the 1st century, the hero of a well-known story related by Aulus Gellius. Having attempted to run away from his master, he was sentenced to be torn by wild beasts in the circus, but to the amazement of the spectators, the lion when let loose rushed up to him and began to lick him fondly. On inquiry it was found that he had once pulled a thorn out of a lion's foot in a cave in Africa, and that the grateful beast had at once recognised in him his benefactor. Androclus was pardoned by the emperor, and afterwards led the lion about the streets of Rome.

Androgynous (Gr., 'male female'), an almost obsolete term applied (1) to plants where the inflorescence is *monocious*, i.e. consists of distinct male and female flowers; and (2) to animals which are *hermaphrodite*, i.e. possess a distinct male and female generative system in the same individual. This is the case with very many of the lower animals, but is not inconsistent with a necessity for the co-operation of two individuals in the propagation of the species. See REPRODUCTION, HERMAPHRODITISM.

Androm'ache, the wife of Hector, was the daughter of Eëtion, king of the Cilician Thebes, and is one of the finest female figures in Homer's *Iliad*. During her childhood, Achilles slew her father and her seven brothers. By Hector she had a son, Scamandrius (Astyanax). Her love of her husband is pathetically depicted in her address to the hero on his going to his last battle, and her lamentation over his death. After a fall Troy, she was given into the hands of Pyrrhus (son of Achilles), who took her away to Epirus, but afterwards surrendered her to Helenus (Hector's brother), by whom she had a son named Cestrinus. Andromache is the heroine of one of the tragedies of Euripides.

Androm'eda, daughter of the Ethiopian king Cepheus and Cassiopeia, like her mother, remarkable for her beauty. Cassiopeia having been rash enough to boast that her daughter was more

beautiful than the Nereids, these offended deities prayed Poseidon (Neptune) to revenge the insult. Accordingly, the territory of King Cepheus was devastated by a flood; and a terrible sea-monster appeared, whose wrath the oracle of Ammon declared could only be appeased by the sacrifice of Andromeda. She was fastened to a rock, and left as a prey to the monster, when Perseus, returning from his victorious battle with Medusa, saw the beautiful victim, and determined to rescue and win her. Having slain the sea-monster, he received Andromeda as his reward. Athena gave Andromeda a place among the constellations. Her story is told in fine English hexameters by Charles Kingsley.

Andromeda, a genus of the Ericaceæ. See HEATH.

Andron'icus OF RHODES, a Peripatetic philosopher, lived at Rome in Cicero's time, and employed himself in criticising and explaining the works of Aristotle, a great number of which he was probably the means of preserving to us. None of the writings of Andronicus himself are extant. He must not be confounded with another Greek and Aristotelian, *Andronicus Callistos*, professor in Italy in the 15th century.

Andron'icus, the name of four Byzantine emperors. Andronicus I., Comnenus, grandson of Alexius I., was one of the most conspicuous characters of his age, which produced no man more brave, more profligate, or more perfidious. In his youth he served against the Turks, in 1141 was for some time a prisoner, and was afterwards appointed to a military command in Cilicia, but was unsuccessful. Having engaged in a treasonable correspondence with the king of Hungary, he was thrown into prison by his cousin, the Emperor Manuel; but after twelve years he succeeded in making his escape, and reached Kiev, the residence of Prince Jaroslav. He regained the favour of his cousin by persuading Jaroslav to join him in the invasion of Hungary, and by his gallantry in that war; but soon incurred his displeasure again, and was sent in honourable banishment to Cilicia. After a pilgrimage to Jerusalem, and his scandalous seduction of Theodora, the widow of Baldwin, king of Jerusalem, he settled among the Turks in Asia Minor, with a band of outlaws, making frequent incursions into the province of Trebizond; but at length made his peace with the emperor, and was sent to Genoa in Pontus. After the death of Manuel in 1182, he was recalled to become, first guardian, then colleague, of the young Emperor Alexius II. Soon after, he caused the empress-mother to be strangled, and afterwards Alexius himself, with whose youthful widow he contracted an indecent marriage. His reign, though short, was vigorous, and restored prosperity to the provinces; but tyranny and murder were its characteristics in the capital. At last, a destined victim, Isaac Angelus, one of his relatives, having fled to the Church of St Sophia for sanctuary, a crowd gathered, and a sudden insurrection placed Isaac on the throne, whilst Andronicus, now 73 years of age, was put to death by the infuriated populace, after horrible mutilations and tortures, on September 12, 1185. For other monarchs of the name, see BYZANTINE EMPIRE.

Andronicus, LIVIUS. See LIVIUS ANDRONICUS.

Andropogon. See LEMON GRASS.

Andros, an island of the Greek Archipelago, the most northern of the Cyclades, separated from Eubœa by a channel, the Doro Channel, 6 miles broad. The island is 25 miles long, and about 10 miles in its greatest breadth, the area being 156

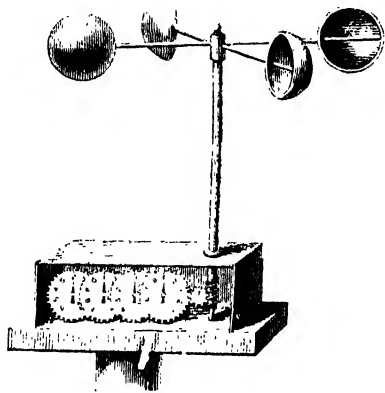
sq. m. Its eastern coast is very irregular. It is mountainous, and on some of its mountains snow lies during great part of the year. The soil is remarkably fertile, and wine, silk, olives, and lemons are produced. The population in 1879 was 22,562. The chief town, Andros, is situated on a bay of the eastern coast. It has a little harbour, and about 1800 inhabitants. -ANDROS is also the name of one of the Bahamas (q.v.).

Andujar, a town of Andalusia, Spain, in the province of Jaén, on the right bank of the Guadalquivir, at the base of the Sierra Morena, 48 miles ENE. of Cordova by rail. The river is crossed by a bridge of seventeen arches. The town is noted for the manufacture of porous cooling clay water-vessels. The Convention of Baylen was signed here on 23d July 1808. Pop. 11,974.

Anecdote (Gr. *an*, 'not,' and *ekdotos*, 'published'), a narrative of any single incident or fact of an interesting nature. The term in earlier times meant only private or hitherto unpublished narratives or details of history, from its use by Procopius, by whom it was applied to his '*Unpublished Memoirs*' of the Emperor Justinian, consisting chiefly of tales of the private life of the court.

Anegáda, the most northerly of the Virgin Islands, lying east of Porto Rico in the West Indies. It contains about 13 sq. m., with a scanty population of 200, and belongs to England. A little cotton is grown. The island is of coral formation, and beset with reefs; but the shipwrecks for which these were notorious are now rare, thanks to the lighthouse on Sombrero.

Anemometer (Gr. *anemos*, 'the wind,' and *metron*, 'a measure'; Fr. *anémomètre*, Ger. *Windmesser*), an instrument for measuring the pressure

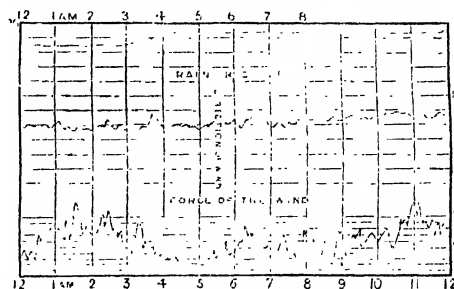


Robinson's Hemispherical-cup Anemometer.

or velocity of the wind. The simplest anemometer is that which is generally known as Robinson's hemispherical-cup anemometer (see fig.), invented by Dr Robinson of Armagh in 1846. It consists of four hollow hemispheres or cups fixed to the ends of two horizontal iron rods crossing each other at right angles, and supported on a vertical axis which turns freely. Experiments show that the cups revolve with about a third of the wind's velocity, and the instrument is so constructed that 500 revolutions are made whilst a mile of wind passes over it. The revolutions are registered by a system of wheels similar to those of an ordinary gas-meter. The difference between two readings gives the number of revolutions passed over during the intervening time, from which the miles can be calculated and the rate per hour.

Pressure anemometers are of very great import-

ance in meteorological observatories and for engineering purposes. Of these, one of the best known is that invented by Osler. In this instrument, the force of the wind is ascertained in a different way from the hemispherical-cup anemometer. A brass plate one foot square is suspended by means of springs, and being attached to the vane of the instrument, is maintained at right angles to the direction of the wind. This plate, by the action of the wind, is beaten back upon the springs, and in so doing, causes a pencil to move backwards and forwards on a sheet of paper placed below it. This sheet of paper is made to pass under the pencil in a direction at right angles to its oscillation; and by means of clockwork, moves at a uniform rate, so that the force of the wind at any particular time of the day is recorded. A pencil in connection with



Register-sheet of an Osler's Anemometer.

the vane, and moving in the same transverse line as the former, records the changes in the direction of the wind; and usually a third pencil, guided by a rain-gauge, registers on the same sheet the quantity of rain that has fallen. The preceding sketch, taken from the first half of a daily register-sheet, gives an idea of the kind of record made by an Osler's anemometer. The space between two upright lines indicates an hour; that between two horizontal lines, in the rain-register $\frac{1}{16}$ of an inch of rain, in the direction of the wind two cardinal points, and in the force of the wind 1 lb. of pressure on the square foot.

Thus, on the day in which these lines were traced, there was in the rain-register, brought over from the former account, between '10 and '15 of an inch; and during the twelve hours, the pencil had only risen one space, indicating a fall of '05, or $\frac{1}{20}$ of an inch, almost entirely between the hours of 3 and 4 in the morning, and immediately before 12 in the day. If the day had been very rainy, and the pencil had risen to the top of the register, it would have fallen immediately to the bottom of it, and begun a new account; and it might have done so several times in the course of the twelve hours. This would have been effected by the mechanism connected with the rain-gauge, which enables the gauge to empty itself each time that the pencil reaches the top of the rain-register. As regards the direction of the wind, it was, during the first six hours, south, veering slightly towards the east; and for the last six hours, it was tending decidedly towards the west, being between 10 and 11 nearly west. From the line marking the force of the wind, it will be seen that the day was stormy. Between 1 and 2, and at 11, the wind was blowing a very high gale, producing a pressure of upwards of 12 pounds on the square foot; and between the hours of 4 and 5, there was a decided lull, the wind being brisk, but not stormy (2 to 3 lb.). Both the hemispherical-cup anemometer and the pressure anemometer are equally indispensable in fully equipped observatories. The former registers only the amount of wind which passes over the place, but does not register the force

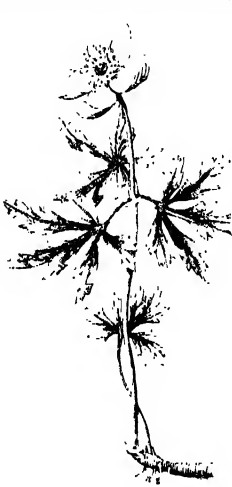
of those sudden and instantaneous gusts of wind to which storms and hurricanes owe their destructive energy. It must, however, be added that a tolerably correct means of registering the force of high winds remains yet to be found out.

In Lind's anemometer, the wind, entering the mouth of one of two upright glass tubes, connected below, depresses the column of water contained in the one tube, and raises proportionately that in the other. This anemometer gives only the roughest results.

The following table gives approximately the relation of the height of the water in the anemometer, to the force and velocity of the wind in winds of different characters :

	Height of Water.	Pressure per Square Foot.	Velocity per hour.
Feeble Wind.....	$\frac{1}{4}$ inches.	$\frac{1}{16}$ lb.	$4\frac{1}{2}$ miles.
Fresh Breeze.....	$\frac{1}{2}$ "	$\frac{1}{8}$ "	$16\frac{1}{2}$ "
Very Strong Wind.....	1 "	$\frac{1}{4}$ "	$32\frac{1}{2}$ "
Tempest.....	4 "	$20\frac{1}{4}$ "	65 "

Anem'one, a genus of Ranunculaceæ, characterised by the acidity prevalent in this order. The species are numerous, and generally beautiful. Most



Wood Anemone (*A. nemorosa*).

of them flower early in spring. They are natives of temperate and cold climates, chiefly of the northern hemisphere. North America has a good many native species. One, *Anemone nemorosa*, the Wood Anemone, or wind-flower, is a common native of all parts of Britain, and its white flowers, externally tinged with purple, are an ornament of many a woodland scene and mountain pasture in April and May; and it is also common in parts of North America.

Another species, *Anemone pulsatilla*, the Pasque Flower, adorns chalky pastures in some parts of England at the same season. Its flowers are purple and externally silky. The Garden Anemone is a favourite florist's flower; the varieties, both single and double, are very numerous, but are chiefly traceable to two species, *Anemone coronaria* and *Anemone hortensis*, though other forms are constantly being introduced of which *Anemone japonica* may be especially mentioned; and whole works have been published on them and their cultivation, which has long been most extensively carried on in Holland. The genus *Hepatica* is frequently included in Anemone. *Anemone hepatica* (*Anemone hepatica*), with three-lobed leaves, is common in Hungary. Varieties of different colours, and both single and double, are among the finest ornaments of our flower-borders in early spring. In cultivation, the soil around them should not be much disturbed.

Anemone, *SEA*, a popular name of Actinia and some allied genera of Actinozoa (q.v.). The term obviously refers to that gay flower-like appearance which has in other countries won for these forms titles such as 'sea roses' and the like. They occur abundantly along our coasts, attached to rocks

or sometimes imbedded in sand, from low-water almost to high-water mark, and are very familiar objects both when expanded with spreading tentacles, and when contracted into a puckered conical knob. They are occasionally borne on floating objects, on the swinging seaweeds, or on other animals. Almost cosmopolitan in their distribution, they attain most magnificent development in the warmer seas, such as the Mediterranean. The sea anemone consists of a muscular tube, fixed by its expanded base, and with a rich crown of tentacles round the mouth. So far it is like a hydroid polyp, but the mouth margin is prolonged inwards to form an open stomach-cavity extending to near the base, and this inner tube is connected with the outer by vertical radiating mesenteries or membranous partitions. Not all of these mesenteries reach right across from outer wall to the stomach-tube, and below the termination of the latter they are all reduced in size so as to leave a wide basal space (see fig. 1). The chambers between the partitions communicate with one another, with the tubular cavities of the very variable tentacles, and with the general body-space. As usual, the body

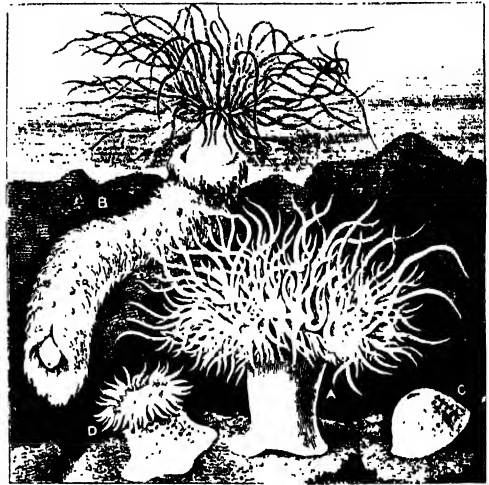


Fig. 1.
A, B, C, D, the (open).

consists of an outer layer or *ectoderm*, an inner layer or *endoderm*, and a slightly developed median layer or *mesoderm*. None of the Actiniae (*Malaco-dermata*) form any skeleton, but the body-wall is very thick and muscular, especially in the basal and oral regions. The outer layer of cells includes a large number of offensive elements—*cnidocytes* or Thread-cells (q.v.), from which fine lassoes bathed in poison are thrown out on the least provocation, and are of great importance in numbing or killing both prey and enemies. The long uncoiled lassoes, usually much longer than the thread-cells which contained them, are too delicate to pierce the skin of the hand, but may be readily felt on cheek or tongue. Besides these, there are abundant sensitive cells scattered up and down in the outer layer, and especially frequent on the tentacles and mouth region. Externally these elements form fine hairs, which catch stimuli from the outside world, while internally they are in connection with a network of nerve fibres and cells lying beneath the skin. The *nerveous system* is thus very diffuse. Developed *sense organs* are often present—e.g. round the margin of the mouth, in the form of azure spots like turquoise beads. These are apparently

rudimentary eyes. Both outer and inner layers form *muscle fibres* which lie apposed to the median sheath or mesoderm. The *mouth* is somewhat sunk below the level of the surrounding disc, and forms an elongated slit, which is occasionally constricted in the middle, so that one end serves for food coming in and the other for waste matter passing out. The mesenteries or partitions are fringed by special coiled filaments, which have been shown to digest food by taking the particles *holus-holus* into their cells. The generative organs are also borne on the sides of the mesenteries, and lastly, in some genera there are long, richly ciliated, thread-like weapons, which are beset with stinging-cells; and can be protruded through special apertures in the body-wall.

Sea anemones are very voracious, and feed on numerous forms of invertebrates. Johnston relates an interesting case of a sea anemone which had contrived to swallow a valve of *Pecten maximus* of the size of an ordinary saucer, and, having become divided into two compartments by the abnormal extension, had formed a second mouth and tentacle-wreath for the lower story. 'The individual became indeed a sort of Siamese twin, but with greater intimacy and extent in its union' (*British Zoophytes*, i. 235). With the exception of a few genera, the Actiniae never form colonies, but remain as isolated individuals. They may attain very considerable size, and though that is usually covered by a few inches, they have been found in the Chinese Sea up to three feet in diameter. The sexes are separate or united. The eggs are fertilised in the body-cavity, and the Planula-like larvæ issue by the mouth. Division may also occur in varied fashion, and buds may also be formed externally or internally. Artificial division has also been frequently performed with success. Some forms attain considerable age, as in the classic instance of 'Grannie'—a common sea anemone (*Actinia mesembryanthemon*), which was taken from the Firth of Forth by Sir John Dalyell in 1828, and which died 4th August 1887. In six years this specimen produced 276 young. Sea anemones afford beautiful illustration of the association of different organisms. Some occur constantly on certain sponges in a more or less passive partnership, while others become associated with hermit

for their bearer, and are also useful in numbing, killing, or paralysing the desired prey. Such a mutual association is termed *Commensalism* (q.v.). Again, certain small fishes are found as commensals sheltered within the cavity of various sea anemones. But an even more intimate association is exhibited in those sea anemones which contain 'yellow cells.' These elements are minute single-celled plants which thrive in mutual partnership with the animal cells of the sea anemone. The carbonic acid given off by the animal cells is as useful to the minute plants as the oxygen and starch formed by the latter doubtless are to the sea anemone. Such an association is termed *Symbiosis* (q.v.). Sea anemones in many cases readily accommodate themselves to confinement in an aquarium, within which, however, they usually try to exterminate their fellow-prisoners.

It remains to notice some representative forms. The commonest British species is *Actinia mesembryanthemon*. It is hardy and readily kept in confinement, though accustomed to move about not a little by means of its muscular basal disc. The mouth margin bears a beautiful circle of rudimentary eyes. *Anthea* or *Anemonia ceras* is also common in the south. It bears towards two hundred long, many-coloured, very mobile tentacles. *Actinia dianthus*, a large and extremely beautiful form, inhabits deep water; and the *Challenger* expedition brought up some species from very considerable depths (see *Challenger Report on Sea Anemones*). A large genus (*Discosoma*), measuring two feet across, is said to spread like a carpet over the Red Sea bottom, and even larger forms are known to occur. Some form for themselves a tubular sheath or other external protection. *Cerastocrassicornis*, found abundantly on the south coasts of England, is one of the largest and most beautiful British forms, measuring about four inches in height, and fully more from tip to tip of expanded tentacles. The colour varies very greatly. A large number of forms (*Hyattella*, *Edwardia*, *Prachia*, &c.) live in the sand, and have narrowed bases and elongated bodies. The best impression of the sea anemone group apart from seeing the actual forms, is to be got by consulting the wonderfully magnificent monograph by Dr Angelo Andres, included in the series of reports on the fauna and flora of the Gulf of Naples. The *Challenger* report on the group ought also to be consulted. Abundant references will be found in these works.

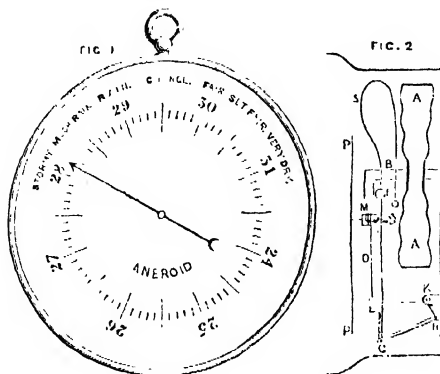
An'eroid (formed from Gr. *an*, 'not,' and *neros*, 'wet'), the name given to a barometer invented in 1844 by M. Vidi of Paris, in which the pressure of the air is measured without the use of liquid, as in ordinary instruments. The face of the aneroid barometer, represented in fig. 1, has usually a diameter of about 5 inches, and the case behind, which contains the mechanism, a general idea of which is given in fig. 2, is about 2 inches deep. The pressure of the atmosphere acts upon a circular metal box, AA, about 3 inches in diameter, and $\frac{1}{2}$ of an inch deep, which has been nearly exhausted of air, and then soldered air-tight. The sides are corrugated in concentric rings, so as to increase their elasticity and strength, and one of them is fixed to the back of the brass case which contains the whole. The amount of exhaustion is such that if the sides of the box were allowed to take their natural position, they would be pressed in upon each other, and to prevent this they are kept distended, to a certain extent, by a strong spring, S, fixed to the case, which acts upon the head of the stalk, B, attached to the side next the face. When the pressure of the air increases, there being little or no air inside the box to resist it, the corrugated sides are forced inwards, and when it diminishes again, their elasticity restores them to



Fig. 2. — *Adamsia Rondeletii* borne by a Hermit Crab.

crabs in a close mutual union. On the one hand they are borne on the mollusk shell, or even on the claws of the hermit crab, and thus secure the advantages of locomotion, of a certain amount of protection, and of a share of the booty; while on the other hand they serve as protective organs

their former place; and thus the little box becomes a spring extremely sensitive to the varying pressure of the external atmosphere. Supposing the two



Aneroid Barometer.

sides pressed inwards, the end of the spring, E, will be drawn towards the back of the case, and carry with it the rod, EG, which is firmly fixed into it. EG, by the link GH, acts on the bent lever, HKL, which has its axis at K, so that, while the arm, KH, is pushed to the right, LK is moved downwards. By this motion, a watch-chain, O, attached at L, is drawn off the little drum, M, and the index-hand, PP, which is fixed to it, would move from the position represented in fig. 1 to one towards the right. When the contrary motion takes place, a hair-spring moves the drum and the hand in the opposite way. By this mechanism, a very small motion of the corrugated sides produces a large deviation of the index hand, $\frac{1}{4}$ of an inch causing it to turn through 3 inches. The aneroid barometer is graduated to represent the inches of the mercurial barometer. Both from its small size and construction, it is extremely portable, and consequently a very useful instrument; but from its liability to change from time to time, it must be frequently compared with a good mercurial barometer. The 'Metallic Barometer' of M. Bourdon is a modification of the aneroid principle. See BAROMETER.

Aneurin, a Welsh poet (603), who, according to the received account, was the son of Caw ab Geraint, chief of the Otadini. Some have, however, identified him with Gildas, the British historian; whilst Mr Stephens makes him Gildas's son. After being educated at St Cadoc's College, at Llanercarvan, he joined the bardic order; was present at the battle of Cattraeth as bard and priest, and in his poem *Gododin*, he mentions the hardships he endured as a prisoner. When released, he returned to Llanercarvan, where it is believed he secured the friendship of a brother poet, Taliesin. In later life he lived with his brother, Nwythion, in Galloway, and is said to have perished at the hands of Eiddyn ab Einygyn. His epic poem, the *Gododin*, which in its present form contains more than 900 lines, tells of the defeat of the Britons of Strathclyde by the Saxons at Cattraeth, but it has been found impossible to gain from it a satisfactory account of the British defeat, owing to the obscurity of the language and the difficulty of interpretation. Edward Davies asserts that the subject of the poem is the massacre of the Britons at Stonehenge in 472 A.D.; while Mr Stephens fixes the date of Cattraeth as 603, identifying it with the battle of Eborac or Dawstone in Liddesdale. Aneurin is also said to have written twelve stanzas on the Months. The *Gododin* was published with

an English version and notes in 1852, by Rev. J. Williams ab Ithel, and the text appears with a translation in W. F. Skene's *Four Ancient Books of Wales* (1866). The Cymrodorion Society published, in 1885, a new edition, with translation, by the late Thomas Stephens.

Aneurism (Gr. *aneurysm*, 'a dilatation') is a 'tumour containing blood, and communicating with the cavity of an artery' (Holmes's *System of Surgery*, 3d ed.). The sac of an aneurism may be formed in the first instance by one or more of the tunics of the vessel, generally the outer one, the two inner having given way. This is called a *true* aneurism, in contradistinction to the *false*, in which the sac is formed of cellular tissue condensed by the blood flowing into it after a wound has been inflicted on the artery from without. Should the sac give way, and the blood escape among the tissues, the aneurism is said to be diffused. True aneurism is almost always a result of Atheroma (see ARTERIES, Diseases of), and is most common in middle life. Aneurisms prove fatal by their pressure on some important part, or by bursting and allowing a sudden escape of blood. They are cured by the deposit, within the sac, of fibrin from the blood—a result the surgeon can promote by obstructing the artery above the aneurism by compression or by ligature; applying the latter close to the sac, if the aneurism is of the 'false' variety, but at a distance if it is the result of disease, or by electrolysis by means of needles introduced into the sac, or by passing into it a coil of fine wire. Internal aneurisms are treated by those remedies which moderate the heart's action, especially iodide of potassium, in conjunction with an abstemious and tranquil mode of life.

Very minute (or *miliary*) aneurisms are sometimes found in the arteries of the brain, a condition which may lead to apoplexy.

Arterio-venous aneurism is the name applied to the communication of an artery with a vein, either directly (aneurismal varix), or through an intervening aneurism (*varicose aneurism*). This condition is almost always the result of a wound injuring both artery and vein, and was at one time not uncommon as a consequence of bleeding being performed by non-professional persons. *Circoid* aneurism, and aneurism *by anastomosis*, are names given to a rare disease, which consists in great dilatation, elongation, and tortuosity of the arteries affected.

Angara, a tributary of the Yenisei (q.v.).

Angioloencitis. See ADENITIS.

Angel. Angels (Gr. *angeloi*, 'messengers') are a class of spiritual beings who appear in the Bible as the attendants of God, and especially as his messengers, and the medium of communication between him and men. (1) In the earlier historical books, the angel has sometimes no apparent form, but is only a voice, as it were; sometimes there is a form indistinguishable from that of an ordinary man, except by the conduct (Gen. xviii. xix.), although elsewhere at times there is something in his aspect that betrays the heavenly messenger (Judges. xiii. 6). The personality of the angel is completely overshadowed in his function; still he has a certain superhuman reality. But in any case he is simply the mouth-piece of God, so that in many passages 'the angel of God' is synonymous with 'God.' At the same time, the angel who specially represents God's presence to his people is distinguished from other angels who but carry out particular commissions. The distinction between the 'angel of the Lord,' who speaks in all things with full divine authority, and the subordinate angels, is based upon such passages as Gen. xviii.; Ex. xxxii. 34, and xxxiii. 2;

Is. lxiii. 9; and Gen. xlviii. 16. The belief that the special 'angel of the Lord,' as distinguished from created angels, was the *Lagos* or second person of the Trinity, and that his appearance foreshadowed the incarnation, is still held by many theologians, but seems unknown to the Old Testament writers. (2) In the poetical and prophetic books, to the name of messengers are added new titles, as 'sons of God,' 'Saints,' or 'Holy Ones,' but they continue to discharge the same duties. (3) To express the majesty of the Almighty and his power in executing his will, the poetic imagination not only conceived of the angels as existing in vast numbers, but ascribed to them a certain war-like character. They are 'the sons of the Mighty,' who appear in war-chariots and form the army of God. Jehovah descends to battle with his hosts, and enters Zion in triumph amidst myriads of heavenly war-chariots. (4) The belief in guardian angels is merely a particular phase of the general idea. Israel has a special angel guide (Ex. xiv. 19, xxiii. 20); at a later period Michael is named their 'great prince' (Dan. xii. 1). Individuals also have their special guardian angels, whose sympathy and help they enjoy, and who joy or grieve with their joys and griefs (Matt. xviii. 10; Luke xv. 7, 10). It was believed that they sometimes assumed the form of their charge, becoming their double, as it were (Acts xii. 15). Not one, but an unlimited number attended on Jesus from his birth to the Ascension, were throughout his earthly life at his command, and will accompany him at his second coming. All this ministry to Jesus, as well as to the redeemed, might have been simply in obedience to the will of God; but they have also a personal interest in the success of the Gospel, and their ministry henceforth is specially connected with the work of salvation (Heb. i. 14; 1 Pet. i. 12), although they are inferior in glory to the Christian (Heb. ii. 16; 1 Cor. vi. 3). In Daniel, the 'angel interpreter' is Gabriel. Greece and Persia have special guardian angels.

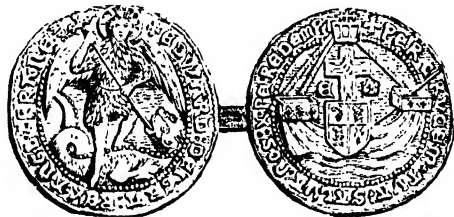
A further development of the doctrine followed naturally from the idea of a host—its division into orders with chiefs, the greatest of whom are *arch-angels*. This idea, however natural from the analogy of an army, is a late conception, and first appears fully developed in Daniel. The ranks and classes of angels are discussed fully in the post-ecclesiastical and apocalyptic literature. In *Enoch*, cherubim and seraphim become distinct classes of angels, and new names are added to the names of the individual archangels. Angels have an important place in the Apocalypse. The seven angels (viii. 2) 'which stand before God' are Michael, Gabriel, Raphael, Uriel, Chamuel, Jophiel, and Zadkiel. The first three are the principal archangels, and in Christian art are often represented together, while the last three have never been generally recognised either in East or West. New features are the angels of the seven churches, interpreted, however, by many as mere human figures, and the association of the angels with cosmical forces—e.g. angels of fire and water (xiv. 18, xvi. 5). According to the rabbinical Jewish literature, there are 12 *mazzaloth* (signs of the zodiac), each with 30 chiefs of armies, each chief with 30 legions, each legion with 30 leaders, each leader with 30 captains, each captain with 30 under him, and each of these with 365,000 stars—and all 'ministering spirits' for Israel (cf. Heb. i. 14).

The Christian Fathers adopted this elaborate hierarchy, adapting it to the Christian Church. The pseudo-Dionysius (4th or 5th century), in his *De Hierarchia Cœlesti*, gives nine orders, finding their names in the Old Testament, and in Eph. i. 21 and Col. i. 16: (1) Seraphim

(q.v.), Cherubim (q.v.), Thrones; (2) Dominations, Virtues, Powers; (3) Principalities, Archangels, Angels. One large sect of the Jews, that of the Sadducees, rejected the belief in the existence of angels as something entirely foreign to the Mosaic system. In the later stages of revelation, a group of angels came to be represented as having fallen from their primitive condition of innocence, and taken up a position of hostility to God. Punished by being degraded from their 'first estate,' they group themselves under the kingship of Satan, and continue to employ their activity in attempting to frustrate the good purposes of God (see *DEVIL*). Angel-worship is specially condemned by St Paul (Col. ii. 18), probably with reference to the doctrine of the Essenes. Cf. Rev. xix. 10. Protestants agree with the Catholic and the Eastern Church in the doctrine of angels, but do not permit the asking of their aid and intercession. Many modern critical theologians find the doctrine foreign to early Jewish religion, but derived from the Persians about the time of the Babylonish captivity; it would then be a part of the wider doctrine of spiritual existences pervading nature. Angels have been favourite subjects in Christian art. They are usually represented as youthful and beautiful male figures, with wings to symbolise their rapidity, and often with harps or other musical instruments to symbolise their incessant praise of God.

See Oswald, *Angelologie, die Lehre von den guten und bösen Engeln im Sinn der Katholischen Kirche* (Paderborn, 1883); Edersheim's *Life and Times of Jesus the Messiah* (Exe. xiii. 3d ed. 1885); Mrs Jameson's *Sacred and Legendary Art* (9th ed. 1883).

Angel, an old English gold coin, at first called more fully the *angel-noble*, because it was originally a new issue of the noble. It was so called

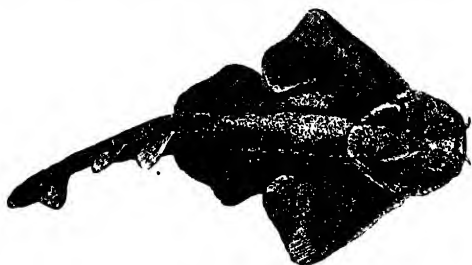


Angel of Edward IV.

from having upon its obverse the figure of the archangel Michael piercing the dragon. It was first coined in 1465 by Edward IV., when its value was 6s. 8d., from which it varied to 10s. under Edward VI. It was last coined by Charles I. It was the coin always presented to a person touched for the king's evil, and after it ceased to be coined, medals with the same device were substituted for it—hence called *touch pieces*.

Angel-fish, a quaint and ugly fish belonging to the shark sub-order of Elasmobranchs (q.v.). It is often called the monk-fish, and is technically known as *Rhina Squatina* or *Squatina angelus*. The body usually measures about 4 feet in length, and is of a sandy gray colour above, and a dirty white beneath. The fish is in structure nearly allied to the sharks, but resembles the skate type, not only in its general habit, but also in its somewhat flattened body, and in its large pectoral fins, which, in their wing-like expansion, have won for this form its undeserved title of *angel-fish*. The gill-slits open laterally, however, and are only slightly covered by the bases of the fore-fins. The rounded head with terminal mouth, and wide spiracles behind the eyes, is wider than the body proper, and is separated from the pectoral fins by a short neck. The pelvic fins are situated just

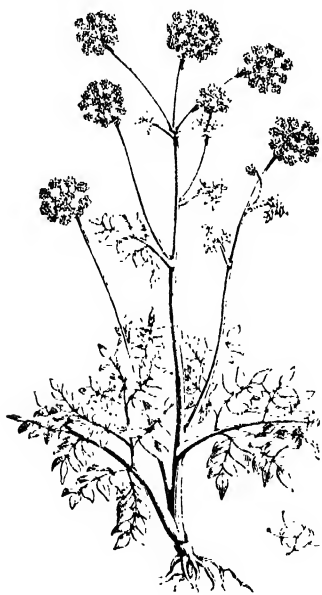
behind the pectorals, and there are two unpaired dorsals towards the tail. The rough skin is richly beset with Placoid Scales (q.v.), and exhibits speci-



Angel-fish.

ally large spines down the back and round the eyes. The teeth are conical. The fish has an exceedingly strong and peculiar ammonia-like smell. It occurs abundantly in European seas, hiding in the sandy bottom, and working havoc among the flat-fish. It is pretty common and specifically identical on the Atlantic coasts of North America. The young are born alive about midsummer. The coarse flesh is said to be nourishing. The rough skin has been long used for polishing purposes, for making instrument-cases and the like, and formerly had some repute as a powder for skin-diseases.

Angelica, a genus of plants of the natural order Umbellifere (q.v.), by some botanists divided into two, *Angelica* and *Archangelica*. The species are mostly herbaceous and perennial, natives of the temperate and colder regions of the northern hemisphere. Wild Angelica (*A. sylvestris*) is a common plant in moist meadows, by the sides of brooks, and in woods in Britain and throughout many parts of Europe and Asia. The Garden Angelica (*A. archangelica* or *Archangelica officinalis*) is a biennial plant, becoming perennial when not allowed to



Angelica archangelica.

ripen its seeds. The whole plant, and especially the root, is aromatic and bitter, with a pleasant

somewhat musky odour, and contains much resin and essential oil. The root was greatly valued in the middle ages as a specific against poisons, pestilential diseases, witchcraft, and enchantments, and was long employed as an aromatic stimulant and tonic, and in nervous and digestive ailments, but is now very little used in Britain. The root of *A. sylvestris*, sometimes substituted for it, is much weaker. The Garden Angelica was at one time also much cultivated for the blanched stalks, which were used as celery now is. The tender stalks and midribs of the leaves, candied, are still, however, a well-known article of confectionary, and an agreeable stomachic; the roots and seeds are employed in the preparation of gin and of 'bitters.' The plant is a very doubtful native of Britain, but is common in many parts of Europe, and even in Lapland and Iceland. Linnaeus describes the use of the dried root in Lapland as tobacco, and of the stem as a vegetable. The roots are occasionally ground and made into bread in Norway, and the Icelanders eat the stem and roots raw with butter. *A. sylvestris* has been used in tanning, and also as a yellow dye. Several species of angelica are natives of North America. The plant was called 'Angelic Herb' because of its repute as a defence against poison and pestilence.

Angelica Tree. See ARALIA.

Angelico, FRA, the commonest designation of the great friar painter—in full, 'Il beato Fra Giovanni Angelico da Fiesole,' 'the blessed Brother John the angelic of Fiesole.' Born in 1387 at Vicchio, in the Tuscan province of Mugello, in 1407 he entered the Dominican monastery at Fiesole, in 1436 he was transferred to Florence, and in 1445 was summoned by the pope to Rome, where thenceforward he chiefly resided till his death in 1455. Of course, his frescoes, such as have not perished, are all in Italy—at Cortona, at Fiesole, in the Florentine convent of San Marco (now a museum), at Orvieto, and in the Vatican chapel of Nicholas V. Of his easel pictures, the Louvre possesses a splendid example, 'The Coronation of the Virgin,' and the London National Gallery (since 1860) a 'Glory,' or Christ with 265 saints. One supreme aim pervades all the creations of Fra Angelico—that of arousing devotional feeling through the contemplation of unearthly loveliness. He has been styled the 'protagonist of pietistic painting;' and estimates of his paintings will vary as much as estimates of monasticism. Mr Ruskin says of him that 'by purity of life, habitual elevation of thought, and natural sweetness of disposition, he was enabled to express the sacred affections upon the human countenance as no one ever did before or since. . . . His art is always childish, but beautiful in its childishness.' See Miss Phillimore's *Fra Angelico* (1881) in the 'Great Artists' Series.

Angeln, a district of Sleswick, between the Bay of Flensburg and the Schlei, noted for its fertility, and supposed to be the home from which came the Angles who invaded England in the 5th century. The principal place is Kappeln.

Angelo, MICHAEL. See MICHAEL ANGELO.

Angelus Bell, in Catholic countries, a bell rung at morning, noon, and sunset, to invite the faithful to recite the Angelic Salutation. It gives name to a very famous picture by Millet. See AVE MARIA.

Angelus Silesius, properly JOHANN SCHEFFLER, a German philosophical poet, was born at Breslau in 1624, of Protestant parents, who educated him in their own faith. After practising some time as a physician, he embraced the Roman Catholic faith and took orders as a priest. He died in 1677.

His philosophy is a singular mixture of mystical pantheism and Christian morality, elevated by a strong personal love of God. Some of his poems are found in German Protestant hymn-books.

Anger is displeasure or vexation accompanied by a passionate desire to break out in acts or words of violence against the cause of the displeasure; which should, of course, be a sentient being capable of feeling the infliction. Like most other emotions, it is accompanied by effects on the body, and in this case they are of a very marked kind. The arterial blood-vessels are highly excited; the pulse, during the paroxysm, is strong and hard, the face becomes red and swollen, the brow wrinkled, the eyes protrude, the whole body is put into commotion. The secretion of bile is excessive. In cases of violent passion, and especially in nervous persons, this excitement of the organs soon passes to the other extreme of depression; generally, this does not take place till the anger has subsided, when there follows a period of general relaxation. The original tendency to anger differs much in individuals according to temperament; but frequent giving way to it begets a habit, increases the natural tendency, and leaves its traces on the countenance. Anger is, often at least, prejudicial to health. It frequently gives rise to bile-fever, inflammation of the liver, heart, or brain, or even to mania. These effects follow immediately a fit of the passion: other evil effects come on, after a time, as the consequence of repeated paroxysms—such as paralysis, jaundice, consumption, and nervous fever. The milk of a mother or nurse in a fit of passion will cause convulsions in the child that sucks. The controlling of anger is a part of moral discipline. In a momentary state of society, its active exercise would seem to be a necessity; by imposing some restraint on the selfish aggressions of one individual upon another, it renders the beginnings of social co-operation and intercourse possible. See *EMOTIONS*; also Darwin, *The Expression of the Emotions in Man and Animals* (1872).

Angermanland, a former division of Sweden, now chiefly comprised in the government of Westernorland, extends along the Gulf of Bothnia, and is watered by the river Angerman. It exhibits great variety of wild and beautiful landscape, and is one of the best cultivated districts in Sweden. The river Angerman, 200 miles long, is, in its lower course, navigable for large ships. The chief town of the district is Hernösand, with a pop. of 5000.

Angermünde, a town of Prussia, on Lake Mande, 43 miles N.E. of Berlin by rail. Pop. (1880) 6833.

Angers (the ancient *Juliomagus* or *Andegavorum*), formerly the capital of the duchy of Anjou, and now of the French department of Maine et Loire, is situated on both sides of the navigable river Maine, not far from its junction with the Loire. It lies almost midway between Nantes and Tours, and is 214 miles S.W. of Paris by rail. Angers is the see of a bishop, and was the seat of a university founded in 1246, abolished in 1685; and it had a military college, at which the Earl of Chatham and the Duke of Wellington received part of their education. David, the great sculptor, was born here. It has also a theological seminary, a medical school, lyceum, a botanical garden, a large picture-gallery, and a public library containing 40,000 volumes. The ancient castle of Angers, built by St Louis about the middle of the 13th century, is situated on a projecting rock above the river, and is still used as a prison. The cathedral is a fine building of the 13th century. Sail-making, wool and cotton spinning, and weaving are carried on, besides a trade in corn, wine, and garden-produce. The neighbour-

ing slate-quarries employ 3000 men. Pop. (1881) 65,225; (1886) 73,044.

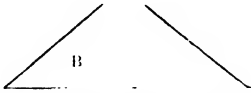
Angina (Lat. *angina*, 'quinsy'; but the term is usually pronounced *angina* in England) is sore throat (see *QUINSY*). In medical parlance it is customary to append an adjective specifying the nature of the affection; thus *Angina rheumatica* is rheumatic sore throat.

Angina Pectoris, sometimes called Heart-stroke or Breast-pang, is characterised by intense pain, accompanied by a sense of constriction, which occurs in paroxysms, beginning at the breastbone and radiating thence in different directions, but chiefly towards the left shoulder and arm. It causes profound anguish and extreme dread, which are shown in the countenance of the sufferer by lines expressive of anxiety and terror; the face becomes pale and drawn, and the extremities are cold; there is a feeling of impending suffocation, and yet the breathing is shallow, for the patient fears to make any movement, and remains in a fixed position, lest he should add to his distress. In many instances, the pulse is small and hard. The attack gradually passes away, or may end in syncope, which is sometimes fatal. There are at times premonitory symptoms, such as nausea or faintness, but usually these are absent. It may appear without any apparent exciting cause, but more commonly the paroxysm follows some unwonted strain on the system, as, for example, excess in eating or drinking, muscular exertion, and mental emotions.

Angina Pectoris is associated with many different morbid conditions, amongst the more common being inflammations and degenerations of the heart and aorta, diseases of the valves, and of the nutritive arteries of the heart. In some cases the pain is caused by inflammation of the nerves of the cardiac plexus, which has extended to them from the heart or aorta; in others, it seems to be due to neuralgia, resulting from interference with the cardiac nerves by degenerative changes in the coronary vessels which accompany these nerves; in others, again, it may be induced by want of nutrition of the heart and its nerves through the diminished blood-supply caused by calcification of these coronary vessels. It has been noticed that the pulse is small and hard—that is, it is of high tension in many cases, and this speaks of a condition of tonic contraction of the heart and arterioles. However produced, the pain originates in the terminal branches of the cardiac plexus of nerves, and is thence conducted by the sympathetic and pneumogastric nerves to the centres of sensory perception, sometimes involving in its course the cervical or brachial plexus, and thus causing the extension of the affection to the shoulder or arm. The treatment of this disease requires before all else that the patient should shun excesses of every kind, and avoid over-exertion of body or undue mental excitement. During the attack, it is absolutely necessary to adopt measures which will promptly relieve the suffering, and amongst such means the most useful are the hypodermic injection of morphia and the inhalation of ether or chloroform; in those cases which have high arterial tension, the inhalation of nitrite of amyl acts like a charm by dilating the arterioles. During the intermissions, the administration of the bromides and iodides has proved useful, and in cases where the tension tends to rise, nitro-glycerine should be given, as it acts in a similar manner to nitrite of amyl, but more slowly and continuously. It is a matter of importance for the patient to have the necessary remedies at hand, and he should invariably carry them about with him.

Angiosperms (Gr. *angion*, 'a vessel,' and *sperma*, 'seed'), a term applied to Monocotyledons and Dicotyledons, in contrast to Gymnosperms (Conifers and Cycads). The distinction emphasised is that in angiosperms the ovules or future seeds are inclosed in a closed ovary, and fertilised through the medium of a stigma, while in gymnosperms the ovule is naked, and the pollen is applied directly to its surface. See OVULE.

Angle (from Lat. *angulus*, 'a corner') means, in Geometry, the opening or inclination of two lines that cut or meet one another. If the lines are straight, the angle is *rectilinear*. The magnitude of an angle depends, not upon the length of the lines or legs, but upon the degree of their opening. If the legs are supposed closed, like a pair



A, right angle; B, acute angle; C, obtuse angle

of compasses, and then gradually opened till they come into one straight line, they form a series of gradually increasing angles; when half-way between shut and straight, they contain a *right* angle. Any angle less than a right angle is called *acute*, and one greater is called *obtuse*. Angles are measured by degrees, of which a right angle contains 90. The angle made by two curved lines (*curvilinear*) is the same as the angle made by the tangents to the two curves at the point of intersection. Angles made by planes with one another can also be reduced to rectilinear angles. When three or more planes meet at the same point, the angular space included between them is called a *solid* angle.—For the *facial* angle of Camper, see SKULL.

Angler (*Lophius piscatorius*), a fish not uncommon on British shores, and sometimes called the *Fishing-frog*, sometimes, from its ugliness and voracity, the *Sea-devil*. It usually measures three feet or more in length. The head is enormously large, depressed, and spinous; the mouth is of



Angler-fish.

similar proportions (whence the Scottish name *Wide Gab*), and furnished with many sharp curved teeth, and with numerous worm-like lip-processes or barbines. The lower jaw is considerably longer than the upper. The body is narrow in comparison

with the great breadth of the head, and tapers rapidly to the tail. The whole fish is covered with a loose skin, almost without scales. There are two dorsal fins, which are spinous, and three anterior rays, regarded as belonging to the first dorsal, and freely articulated to the head, which are with great probability supposed to serve the animal as delicate organs of touch. The nostril tube is elongated into a membranous stalk, capable of spreading out like a cup at the upper end, and of being moved in every direction by a very numerous set of muscles; the bottom of the cup being divided into projecting leaflets, on which the olfactory nerve is finally distributed. The angler lives very much along the bottom, and, like the angel-fish, is said to attract its prey by dislodging worms from the sand. The dorsal filaments on the back of the head have been credited with attractive functions from before the time of Aristotle. The fish is exceedingly voracious, scores of undigested herrings, &c. having been frequently found in a single stomach. It is common in all North Atlantic coast waters. Other species are known in Mediterranean, Pacific, and South Atlantic waters. The genus *Lophius* belongs to the order Xanthopterygii, and to the family Plediclati, remarkable for the elongation of the carpal bones, so as to form a distinct wrist, to the extremity of which the pectoral fin is articulated. By means of this development, these fishes are able to leap up suddenly to seize the prey which they observe above them; and some of them can hop about upon seaweeds or mud from which the water has retired. They do not suffer so quickly as most other fishes from being out of the water, their gill-opening being very small, and an angler has been often known to devour flounders or other fish which have been caught along with it. Most of the Plediclati are tropical.

Angles (*Angli*), a German tribe who occupied the country still called Angeln (q.v.), on the east of the Elbe, between Sleswick and Flensburg. Along with the Saxons and Jutes, they passed over in great numbers to Britain during the 5th century, and settled in East Anglia, Northumbria, and Mercia. Together with their kindred races, they formed the powerful people who came to be known as the Anglo-Saxons (q.v.). From them England derives its name (Lat. *Anglia*, Anglo-Saxon, *Engla-land*). After these migrations from Sleswick, the Danes from the north entered the deserted districts, and mingled with the Angles who remained there.

Anglesey, or ANGLESEA (A.S. *Angles Ege* i.e. 'the Englishmen's island'), an island and county of Wales, on the north-west coast of that principality, being separated from the mainland by the Menai Strait (q.v.), which is spanned by the suspension bridge (1826) and by the tubular bridge (1850). Its form is that of an irregular triangle, the base facing the mainland. The extreme length of the island is 21 miles; its extreme breadth, 19; the coast-line measures about 80; and its area is 302 sq. m., or 193,453 acres. The climate is mild but foggy, especially in autumn; the soil, generally a stiff loam, varying with sandy and peaty earth; the general aspect of the island, flat and uninteresting, there being very little wood. The prevailing rock is mica schist; limestone ranges traverse the county; granite, marble, coal, serpentine, and soapstone are also found. The island is rich in minerals; the Parys and Mona copper-mines, near Amlwch, were opened in 1758. Lead ore, containing much silver, has also been found. The manufactures of Anglesey are inconsiderable. Agriculture, though still rather backward, has yet in recent years made considerable advance in the way of adopting means

of improvement. Increased attention has also been given to the breeding of cattle and sheep, which latter are a white-faced, hornless breed, the largest in North Wales. Anglesey was known to the Romans under the name of *Monia*. It was one of the chief seats of the Druidical power, which in 61 A.D. was all but destroyed by the Roman general, Suetonius Paulinus. The island was again subdued by Agricola, 76 A.D. Egbert conquered it in the 9th century; but the native princes afterwards recovered their dominion, establishing the seat of government at Aberffraw. It was finally subdued by Edward I. The ancient remains consist chiefly of dolmens, two of which, side by side, are in the park of Plas Newydd, the seat of the Marquis of Anglesey. At Holyhead are the remains of a Roman camp. The county is divided into three districts, called *centres*, each subdivided into two *commads*. The market towns are Amlwch, Beaumaris, Holyhead, Llangefni, and Llanerch-y-medd. The first four of these towns united in sending one member to parliament till 1885, when they were merged in the county, which returns one member.

Anglesey, HENRY WILLIAM PAGET, MARQUIS OF, born May 17, 1768, from Westminster passed to Christchurch, Oxford, and sat in parliament for the Carnarvon boroughs (1790-96). Entering the army, he served with distinction in Flanders (1794), Holland (1799), and the Peninsular war (1809); represented Milborne Port (1806-12), and in 1812 succeeded his father as Earl of Uxbridge. For his splendid services as commander of the British cavalry at Waterloo, where he lost a leg, he was made Marquis of Anglesey. In 1828 he was appointed lord-lieutenant of Ireland, at a period when that country was greatly agitated on the question of Catholic emancipation; and his advocacy of that measure procured his recall by Wellington in 1829. From 1830 to 1833 he held the same office under Lord Grey's administration; but O'Connell had now commenced his career of agitation, and the Marquis was forced to resort to severe coercive measures, which destroyed his earlier popularity. To him, however, Ireland is indebted for the Board of Education. From 1846 to 1852 he was Master-general of the Ordnance in the Russell ministry; and in the former year he was raised to the dignity of field-marshal. He died April 29, 1854.

Anglia, *East*, a kingdom founded by the Angles about the middle of the 6th century, in the east and part of central England, in what forms the present counties of Norfolk and Suffolk—names which doubtless refer to a twofold settlement now entirely forgotten. At first to some extent dependent on Kent, and afterwards on Mercia, on the fall of the latter it was attached to Wessex, without, however, losing its own kings until the time of the Danish invasion, when it was seized by the invaders, and formed into a Danish kingdom under Guthrum (878). Edward, the son and successor of Alfred, after a long struggle forced the Danes to acknowledge him in 921. Under him Wessex grew to be England, and East Anglia was henceforward part and parcel of the kingdom. It was one of the four great earldoms of the kingdom under Canute. The modern see of Norwich is equivalent in extent to East Anglia, being an incorporation that took place about the end of the 9th century of the see founded for the Northfolk at Elmham (removed first to Thetford in 1078, then to Norwich in 1101), and that founded at Dunwich for the Southfolk.

Anglican, belonging to the Church of England (q.v.) and the other churches in communion with it in Ireland, Scotland, and the United States. Sometimes used specially of the High Church party.

Angling is the art of catching fish by rod, line, and hook, or by line and hook, the salient feature of the pursuit being the allurements of the prey by an attractive bait. The requisites for a successful angler are, knowledge of the haunts and habits of fish, dexterity in the use of tackle, and a patience much in excess of that required for most out-door amusements. The first qualification covers a wide field of study, involving, as it does, familiarity with the movements of fish at different seasons of the year, and in varying conditions of water; with the food peculiar to different species; and with the characteristics of the fishes angled for. Much of this may be learned from the voluminous works upon the subject, but personal observation in the essentials of the sport, which has been designated 'the contemplative man's recreation,' is absolutely necessary for mastery of an art which is no less difficult than delightful. In like manner, skill in the use of rod and line depends more upon actual experiments by the water-side than acquisition of theories published by others.

The antiquity of angling is indicated in the well-known passage by the prophet Isaiah (xix. 8), variously translated in the past, but newly rendered in the revised version as 'The fishers also shall lament; and all they that cast angle into the Nile shall mourn.' Other Old Testament writers are also claimed as witnesses to the ancient practice of fishing with hook and line. That it was known to Greeks, Romans, and Egyptians as a pastime, may be gathered from inscriptions, coins, frescoes, and other relics of the remote past; and Homer and Plutarch wrote with great accuracy of detail, and some sympathy, upon fish, and the methods in vogue in their days for catching them. A reference by Martial even suggests that fly-fishing, which is sometimes supposed to be a comparatively modern accomplishment, was known to the Romans in the 2d century. Ovid in his *Halieutics* vividly and enthusiastically describes in flowing hexameters the entire process of luring, striking, and playing a fish; and from the phrase, 'Above the tugging fish the arch'd reel bends,' it may be seen, not only that the ancient angler used a rod, but that it was supple and light.

The first printed English book on angling was the second edition of Dame Juliana Berners' (or Barnes) *Book of St Albans*, in which, to a previous chapter on hawking and hunting, was added a *Treatise of Fysshynge with an Angle*. Shortly after this publication, Wynkyn de Worde (probably in 1490) issued the angling chapter as a separate book. In 1590 Leonard Mascall published *A Booke of fishing with hook and line, and of all other instruments thereto belonging*. John Denny's poetical *Secrets of Angling* followed in 1613. Thirty-eight years later Thomas Barker's *Art of Angling* appeared, to be succeeded in two years by Isaac Walton's *Complete Angler*, of which 92 editions have been published. The number of books on angling has marvellously increased during the last fifty years, and Westwood and Satchell's *Bibliotheca Piscatoria* (1883) catalogues 3158 editions and reprints of 2148 distinct works on fish and fishing.

Modern angling is pursued under vastly different conditions to those discussed by writers of the last century; and though all the rudimentary basis of the art remains what it has been for generations, altered circumstances have produced a new development. These arise from the growing facilities for travelling; the establishment of a cheap and extensive literature, periodical and permanent; the advance of science in the direction of fish-culture and mechanical appliances; and the better condition of the people. There is scarcely a large town in England without its angling clubs; and in the cities, the artisan anglers who fish such rivers

as Thames and Trent may be counted by thousands. To conclude, therefore, that there are a thousand anglers to-day where there was one fifty years ago would not be extravagant. The waters are, as a natural result, in constant danger of over-fishing, and can only be made to yield sport by systematic stocking; while the restrictive rules of societies and recent legislation have tended strongly to heighten the sportsmanlike qualities of angling, and to conserve our rivers and lakes.

The fish caught by angling in Great Britain are the Salmonidae—such as the salmon, trout, char, and grayling; and the summer spawners, or coarse fish—such as pike, perch, roach, chub, dace, bream, carp, barbel, tench, bleak, ruffe, and gudgeon. Attempts, not always wise, are being made to introduce new sporting fish into British waters; but for all practical purposes, those enumerated are the game for which the angler seeks. The natural history of each species, and the special methods employed in their capture, are described in subsequent pages, under the names of the respective fishes; but there are many general principles which pertain to angling as an art, and which concern all classes of anglers in all parts of the world.

FISHING TACKLE. The soundest advice we can tender to the angler in the matter of fishing-tackle, is to clutter himself with as little as possible, and to see that what he uses is good, but of the simplest kind. If one might form an opinion from the bulky illustrated catalogues circulated by the tackle-makers, there is no class of sportsmen so full of fancies and crotchets as anglers; but every experienced fisherman knows that a large proportion of the prey-patented novelties are made to sell, rather than for practical use. Much of the pleasure of angling is lost when the angler hampers himself with too much baggage. He requires a rod, line, winch, bunts, and receptacle for his fish; and should be able to carry all, and indulge in his sport, without fatigue from the burden strapped across his shoulders, and independent of assistance. As a rule, it is cheaper to buy than to make fishing-tackle; but it is most useful in case of emergencies to know how to whip a hook to gut, how to repair a broken rod, how to replace a lost ring, or how to tie an artificial fly. The tackle-book should therefore not be without a pair of small pliers, scissors, and waxed silk and thread. Having discovered the description of tackle that suits him and the branch of fishing in which he engages, the angler should stick to it, and not be tempted into acquisition of new fangled gear merely because it is novel. All tackle should be carefully tested before use, and put away clean and dry after use. The habit of dealing with it at the end of the day's sport should be a primary requirement, from considerations alike of economy, efficiency, and comfort.

Rods depend entirely upon the branch of angling to be followed. The aim of every rod-maker should be, when suppleness is a necessity, to produce an implement as closely as possible resembling a natural growth like the bamboo, or the peeled wand used by boys in their novitiate; and in rods where stiffness is an essential, a regularity of strength that shall produce a true *lance*. The heavy clumsy fishing-poles of our grandfathers are quite out of fashion, and the adoption of cane as a material for rods has assisted materially in the revolution, which was begun in the United States. For a while, the American makers were able, with some degree of justice, to boast that they produced the best finished rods in the world, though their toy-like elegance was never much appreciated by British anglers. The light and strong rod made of sections of cane, joined with perfect accuracy,

and known as the split-cane rod, was, however, soon imitated by English makers, and with a success that has placed them on an equality with any in the world. The great cost of these rods has hitherto stood in the way of universal adoption, but there is no gainsaying their superiority in lightness combined with power. Ten guineas for a salmon rod, and four or five guineas for a trout rod, are almost prohibitive prices, when, for less than half the money, serviceable implements of greenheart, hickory, or lancewood can be obtained. A very fair rod may be purchased for a guinea; and we have amongst a costly collection, a handy little trout rod, purchased for half a guinea in Edinburgh, that was preferred to the best of them, until an accident laid it on the rack.

For fly-fishing, a spliced rod is preferred by experienced anglers, especially for salmon; but the ferrule has become almost universal for general angling. The old-fashioned practice of hollowing the butt for receiving the spare top is not to be recommended, since it weakens the rod at a critical part, and destroys the balance. The main point in selecting a rod is to choose one that fits the hand, and to pay for utility and not for ornament. The ferrules should be stopped when the rod is idle; and the bag in which the joints are kept should be suspended from a loop, to prevent the warping of the pieces. The trouble arising from the sticking together of the ferruled joints, may be avoided by rubbing the brazen parts with common soap. Standing rings are now preferred, and the ring at the end of the top joint is best with a revolving centre.

Lines and Winches are very important items of outfit, and they are made in inconceivable variety. The former are of plaited silk, cotton, hair and silk, hair and gut, and horse-hair. The plaited lines are either dressed or undressed, to make them waterproof and prevent kinking; but if dressed, the process should be of the best, otherwise the cracking of the dressing will be a constant source of irritation and mischief, and the work will have to be continually repeated. Any good angling book will give recipes of line-dressing, but amateur dressing seldom answers. Plaited silk lines, tapered down to meet and correspond with the finest gut casts, and well dressed, are much used; they are stronger, susceptible of better casting than the silk-and-hair lines, which they have supplanted, and do not retain the water. In many districts, however, the more primitive lines are still used. Lines should be unwound from the winch at the earliest moment after use, and thoroughly dried before winding up; and at the river, the first thing that should be done after the line has been drawn through the rings, previous to the putting on of the gut cast, is to subject a few yards to a trial of strength, so that no weak spot may be left, to lead, perhaps, to loss of both tackle and fish. Winches are of nickel-silver, bronze, vulcanite, brass, and wood, the cheapest being the last two. The most serviceable winches (called also *reels*, and in the north of England *gines*) are those with least mechanism. For the higher exercises of angling, nothing can beat a strong-made bronze winch with a reasonable amount of check. For the commoner practices of bottom-fishing, the Nottingham winch, made of wood, and running without any check, is popular; but without care and acquirement of the trick of handling, the line will overrun and become entangled. The line for this winch should be the soft undressed silk, which also takes its name from the town of Nottingham.

Foot-lines are the lengths of finer material attached to the line for the more complete deception of fishes. They are either of gut or single horse-hair, and are essential to fly-fishing and other

ANGLING

forms of angling. When used by fly-fishers, this foot-line is sometimes called a collar, and sometimes a cast, and it is generally made of gut. Occasionally, and in special districts, horse-hair casts, tapering from a twist of three to a single strand, keep their ground, it being claimed for them that they have an elastic spring, and a freedom from glitter impossible with gut. Reliable hair casts are, however, difficult to procure, and when used are invariably home-made by some local specialist. Gut must be round, even, and transparent, and should be well moistened and straightened when wanted. Three yards is the orthodox length of a cast, but less will suffice for float-fishing. Of late years difficulty has been experienced in procuring the best gut for salmon-fishing, but the process of making drawn gut insures an unlimited supply of the finest casts for trouting.

Hooks are now made with eyes, both upturned and turned down. In the nomenclature and numbering of hooks there is great confusion, the makers of Redditch and Kendal using different terms. The standard patterns are Limerick, Kendal, Kirby, Sproat, Carlisle, and Round; and one of the newest forms is the Pennell-Limerick. Although the Japanese artificial flies are made with barbless hooks, and American anglers use a hook which is called barbless, it is impossible in this respect to improve upon the familiar plan. In very olden times hooks were clumsy and ill-contrived, but the necessity of a barb was well understood; and in the South Sea Islands, the native hooks, with their rind shanks of mother-of-pearl, have a sharp curved fork of bone, answering the purpose of a barb.

Miscellaneous gear for angling comprises the basket or bag, without which the equipment would lack its most cherished object. Whether the basket or creel is better than the bag (waterproof or the reverse) is entirely a matter of taste. Boxes of thin, polished wood, of japanned tin, and of paper-maché, are made for those who have lost faith in the common fishing-basket of commerce; but we might be content with a roomy creel, made, not of the closely-woven French work, but of the coarser fabric of osier, manufactured in Scotland and the English provinces. The fishy-smell, which is an offence to many, can be removed from bag or basket by washing with Comby's fluid mixed with warm water. The landing net is for securing the fish which is played out, but yet too heavy to be lifted from the water bodily by the line; and the gaff is for salmon and pike too large for treatment with a landing-net, which must be small to be portable, and capable of being hitched to the strap of the basket, and carried behind the shoulders ready for use. An angler's gear, however, is regulated by the character of his sport; and other articles, when necessary, will be incidentally mentioned hereafter, in the paragraphs concerning the three main branches into which angling, as practised in Great Britain, may be divided—viz. fly-fishing, spinning and live baiting and bottom-fishing.

Fly-fishing is the highest form of angling, and it is applied to the most valuable of our fresh water fish. Many sportsmen consider any other kind of fishing as unworthy of consideration, forgetting that it is the lower branches which give the greatest happiness to the greatest number of anglers. Fly-fishing for salmon comes first, the salmon being most truly described as the king of fish. No one has yet discovered, though many conjectures have been offered, what the salmon supposes the artificial fly to be. As there are no insects at all resembling the gaudy affairs of fur and feather to which the salmon rises, it can scarcely welcome it as a dainty gift from the insect world;

and the most plausible theory is that the so-called artificial fly, bright with all the colours of the rainbow, and worked by jerks in the water, against or across stream, until the feathers and hackles move like the antennæ of some living creature, is taken for something in the nature of shrimp or beetle. There are many problems unsolved with respect to salmon, and this is one of them. Salmon-flies vary in size from the Shannon or Tay pattern used in spring, with shank nearly 3 inches long, to the low-water favourites scarce bigger than a trout-fly. To describe the different patterns would be to enumerate all the salmon rivers of the kingdom, since each district has its favourites. There is, perhaps, no more useful fly than the Jock Scott, originally a Tweed invention, but now tried everywhere. The Durham Ranger, Doctor, Popham, Wilkinson, Childers, Goldfinch (or Canary), and the Parson, are seldom missing from the salmon-fisher's book. Salmon-flies are sometimes, but should never be, whipped to strands of strong gut, which frays, and soon becomes treacherous at the head. The alternatives are a loop of gut, or the eyed hook recently introduced. The salmon-rod should be from 16 to 18 feet long, according to the strength of the angler. The salmon-fly is cast across and down the pool, and worked deep or high, fast or slow, as the humour of the fish may determine.

Fly-fishing for trout is a more delicate operation. Until comparatively recent years, the fly-fisher attached two, three, or more flies to his cast, threw them lightly up or down stream, as his experience prompted, and allowed them to float naturally with the current. There are amongst trout-fishers an up-stream faction and a down-stream faction, the former using a short line and casting up the stream. By this method the angler is always behind the fish, minimises the risks of scaring, and is able to strike the hook firmly into, and not out of its mouth. This is doubtless the most scientific style when conditions are favourable. To allow the flies to drift down below is, however, easier, and in very rapid waters, is, indeed, the only way in which fishing can be carried on. The flies used are winged in imitation of the Ephemera and other water insects; hackled only, or so little dressed as to be termed spiders. These have their distinct uses on different streams. The latest school of fly-fishers advocate the floating or dry fly system, as practised on the crystal chalk streams of the south of England. One fly only is used, and this must be cast to float upon the surface of the stream with upright wings, in resemblance of the freshly hatched insect tribe that happens to be on the water. The custom is to cast over rising fish only, and not to work on speculation, as practitioners with the wet fly do. The justification for this system is the growing shyness of the trout; and upon choice rivers like the Itchen, Test, and Kennet, the method seems to be indispensable. On ordinary trout streams, however, flowing swiftly from hill sources, the common fashion pays best. Trout-flies are, like the larger hures for salmon, too numerous to particularise, but there are a few standard patterns that may be mentioned: Olive-dun, March Brown, Hare's Ear with Silver Twist, Red Spinner, Cow-dung, Needle-fly, Black Gnat, Red and Black Palmer, Governor, Alder, Black and Red Ants, Couchman, and Sedge. The stone-fly and May-fly (green and gray drake) are specialities, and confined to a brief season of the summer. When the rise of fly is good, the trout take it ravenously, and the largest bags of the year are then made. These insects are, however, peculiar to certain rivers, and so capriciously are they distributed that the upper half of a river will produce them while none are

hatched from the bed of the lower half. The artificial May-fly has large up-standing wings of drake, widgion, teal, wood duck, or Egyptian goose, with bodies of straw, india-rubber, bark, cork, and maize husk, besides the more ordinary wool and silk. The hooks are as large as those used for loch-flies in Scotland. The live May fly and stone-fly are very killing; and north of the Trent the larva of the stone-fly, under the name of creeper, is much used.

In fly-fishing, the golden rule is to keep as far as possible away from the water, and out of sight of the fish; to make the line and fly drop lightly and straight; to strike firmly, but gently; to keep the hooked fish well in hand, and get it down stream without delay. Eyed hooks are recommended because they may be easily carried in a small box, because there is no risk from the fraying of gut at the head of the fly, and because the angler is always sure that the gut nearest the hook will be of the size required.

Spinning and live-baiting are processes in salmon, trout, perch, and pike fishing. Spinning may be accomplished with either an artificial or natural bait, the object being to present to the predatory fish angled for, a colourable imitation of one of the smaller species swimming away from it. It ranks next to fly-fishing as a sportsmanlike branch of angling. The spinning baits revolve upon a swivel, and are best worked against stream. Artificial baits are made of silvered, gilt, or pointed metal, gutta-percha, and in the phantom, a capital specimen of the class, of soleskin, which is filled with water by the action of spinning. They are moulded and painted to resemble small trout, gudgeon, or dace, and made to spin by a fan protruding from each side of the head, or by a tail on the principle of the archimedeian screw. The spoon bait, which is often coloured red inside, spins by reason of its convex shape, and is a most killing bait for all fish of predaceous habits. The best foot-line for spinning baits is of twisted or single salmon gut, with at least two swivels; and when leads are necessary they should be coloured green. Many anglers fail in spinning through not sinking the bait deep enough, and through spinning too rapidly. The fish to be caught often lie low, and the angler must operate as much as he can upon their level. The larger baits will serve for both salmon and pike; the smaller artificial minnows, for trout and perch.

Dace, trout, or gudgeon of seven inches long, or minnows, if for trout-fishing, are the natural baits most suitable for spinning flights. The 'flight' is a series of triangle, double, or single hooks, whipped upon gimp for pike, and strong or fine gut for salmon and trout fishing; and it must lie along the body of the bait, and be so affixed that it shall spin something near nature. The advantage of the spinning bait is that the fish may be struck on the instant of seizing it. In pike fishing, success may often be achieved, when straight spinning does not succeed, by causing the bait to spin irregularly. The movement is termed a 'wobble' by anglers, and is supposed to suggest a wounded fish trying to escape from danger. Wood's Chapman spinner produces a straight spin, and requires no artificial piece of straight wire which goes into the mouth and body of the bait being sufficiently weighted, while the rotatory motion is given by flanges at the head. Pennell's flight, which requires the usual lead, and which receives its spin from the tail strongly curved by a curved 'cage' hook, is a good sample of the spinner with wobbling action. The spinning baits are as effective in salt as in fresh water angling.

Live baits, in the parlance of anglers, are small fish, shrimps, or frogs. They must be vigorous,

and should be used with snap-tackle, that is to say, with hooks so arranged that they enter the mouth of the fish, and may be extracted to enable undersized or ill-conditioned specimens to be returned to the water. They are used with float, suspended at varying depths and travelling with the stream, or upon the *puer-muster*, a length of stout gut with single hooks attached to short lengths of gimp or gut. These are fastened to the foot-line by loops, and the hooks being baited, the apparatus sinks to the bottom by means of a weight at the end. The use of the gorge-hook for live baiting and trolling has long been discredited as unsportsmanlike, but it is often used. It is absorbed into the gullet, the two hooks finding lodgment in a vital part.

Bottom fishing is a term which is intended to express the art of angling for fish feeding on the beds of streams, and, though it is not precisely accurate, we may for expediency here adopt it. The rod for bottom-fishing is stiffer than that required by the fly-fisher; and the recreation is often sedentary. The exception is angling for trout in a clear stream with Stewart's tackle, a fine art in itself, which, strictly speaking, ought not to be included in this category. To kill a dish of trout when the water is at summer level and clearness, by ascending the stream, and deftly casting the worm upon Stewart's delicate tackle, is evidence of real proficiency in angling. No such skill is demanded in ordinary bottom-fishing, in which the shotted line is suspended by a float, and the hook, either on the bottom or at regulated depth above it, is baited with worm, maggots, caddis, bread paste, boiled wheat, rice, meal worms, or wasp grub. The once fashionable perfumed baits are no longer believed in; but pastes sweetened with honey, or tinged with vermilion, are affected by many of the patient brethren to be met with sitting hopefully on the bank, or in the punt, waiting for a bite. Bottom-fishing is peculiarly the poor man's pleasure. Of fine trout waters, save in Scotland, Ireland, and Wales, few remain; but the humble coach or perch fisher has his privileges still amongst what are called the coarse fish. The branch of bottom-fishing most directly answering to the name is that known as *legering*. With this method, the gut foot-line passes through a hole in a piece of flattened lead, and is kept in place by split shes a foot or so above the baited hook, which lies literally on the bed of the river, leaving the foot-line free to run through the weight to the limits of the small shot. Legering is principally used by barbel-fishers, but other fish are captured by it. For this amusement a hard, clean river bed is essential. Angling is largely practised in the United States, Canada, Sweden, Norway, and Iceland. The trout and grayling streams of Germany and Austria are famous for sport. In India, the mahseer is the object of the angler's desire; in New Zealand and Tasmania, the successful acclimatisation of trout has introduced a new recreation for colonial anglers.

Angling authorities.—To the foregoing general remarks upon angling, we may add a recommendation of works which will initiate the angler into all the mysteries of the craft. Walton's book is ever delightful from its quaint style, pure tone, and sweet descriptions of nature. As a practical treatise on angling, it is, however, in many essentials out of date, and should not be read without modern editing. *The Book on Angling*, by the late Francis Frances, is the standard authority on what we may term cosmopolitan angling. Every branch of the art is clearly treated by a master-hand, and the work ranging over the three kingdoms, is serviceable to the salmon-fisher

of Tweed, Beaulieu, Shannon, or Conway, no less than to the roach-angler of Thames, Lea, or Trent. The fishing volumes of the Badminton Library—Manley's *Fish and Fishing* and Foster's *Scientific Angler*—also cover the whole ground. Amongst works upon distinct branches of angling may be indicated Halford's *Floating Flies*, Pennell's *Book of the Rouch*, Pennell's *Book of the Pike*, Braithwaite's *Salmonids of Westmoreland*, Cutcliffe's *Art of Trout-fishing in Rapid Streams*, Pritt's *North Country Flies*, and H. Cholmondeley-Pennell's *Modern Improvements in Fishing Tackle and Fish Hooks* (1887). In the angling literature of Scotland there is a choice of riches, such as Stewart's *Practical Angler*, Stoddart's *Angler's Companion*, Colquhoun's *Moor and the Loch*, St John's *Sketches*, and 'Black Palmer's' *Scotch Loch-fishing*. *The Angler and the Loop Rod*, by David Webster, is a clever treatise in advocacy of a peculiar method practised on Clyde and Tweed. The handbooks of fishing localities are the *Angler's Diary*, touching upon angling in all parts of the world; Watson Lyall's *Sportsman's Guide to the Rivers, Lochs, &c. of Scotland*; Cliffe's *Notes and Recollections of an Angler*, for Wales; and, for Ireland, Rogan's *How and Where to Fish in Ireland*, Thomas's *Rod in India*, and Senior's *Travel and Trout in the Antipodes*, refer to more distant lands. The standard reference work on angling literature is Westwood and Satchell's *Edithwaite Piscatoria*.

Anglo-Catholic is a term used of the Church of England generally, but especially of the High Church section, which claims that the national church is Catholic (as opposed to Roman Catholic), and repudiates the name of Protestant. See ENGLAND (CHURCH OF).

Anglo-Israelite Theory, an opinion as to the historical origin of the English people held by a considerable number of persons in Britain and America. They contend that the English are descended from the Israelites who were carried into captivity by the Assyrians under Sargon in 721 B.C. The Israelites were carried into Media, where they are identified with the Sacer or Scythians, who appeared as conquering hordes there about the same time. They next swarmed westwards into Northern Europe, and became the progenitors in particular of the Saxon invaders of England. Unfortunately for the conclusion, the premises must both be questioned; and we have not yet been presented with any satisfactory proof either that the Anglo-Saxons are the Sacer, or that the Sacer are the Israelites. And it must not be forgotten that Scythia is much more a geographical than an ethnological term. Moreover, the so-called 'identifications,' on examination, prove to be little more than verbal quibblings on the English letter, depending for their success on the reader's ignorance of Hebrew exegesis. Thus one of the strongest is, that according to prophecy, lost Israel's location must be 'the isles.' The applicability of this to England is at once obvious. But unfortunately for the argument, the word rendered 'island' or 'isle,' is applied in the Hebrew text indifferently to any district on the sea coast separated from Palestine by water—the shores around the Mediterranean, and the coast of Greece and Asia Minor, as well as islands proper. Much is made of 'Jacob's stone' in the coronation chair at Westminster Abbey; of the fact that the Irish, or Garmaites, still trouble us according to prophecy; that in public worship we still pray towards the east, as if the posture were peculiar to English Christians; &c. On such feeble arguments as these, we are gravely asked to believe that pro-

phesies which apply to all Israel relate to ten tribes only, to the complete exclusion of the two tribes represented by the Jews throughout the world at the present day. These prophecies, which have no meaning at all if not national and spiritual, are interpreted as if mundane and political, and referring to a portion only of Israel. We are told, moreover, that the well-marked physical features of the Jews are the special effect of the curse of God upon them; and when we ask for any survivals among the English of such peculiar and persistent customs as circumcision, seventh-day observance, legal uncleanness, and the like, we are told that the identity was to be lost, and that our ignorance is the best proof of the theory's being true. Of course, all evidence goes to show the impossibility of such peculiar customs and the language of a nation being so completely forgotten; and it is hardly enough for the opponents of a theory that sets at defiance all ethnological and linguistic evidence to be assured that nevertheless it is proved by a particular interpretation of Scripture assumed to be as infallible as its own authority.

The 'lost tribes of Israel' have been sought for in almost every quarter of the globe, and as one nation answered the conditions of the theory about as well as another, 'the remnants of the ten tribes were found marauding in the Afghan passes, wandering with the reindeer in Lapland, chasing buffaloes on the American prairies, or slaughtering human victims on the teocallis of Mexico.' But the enthusiasm of Rudbeck, Garcia, and Adair had at least one good result: it caused evidence about the facts of manners and customs—afterwards to be, in the hands of scientific students, of great value for the history of civilisation—to be preserved before it was lost before advancing European influences. The ten tribes delusion has now, however, sunk to a lower level than when Lord Kingsborough spent his fortune in publishing the Mexican pictures and chronicles. In spite of all the new text knowledge as to races, it has even now more votaries than ever. 'There is indeed no doubt,' says Dr Pylon, 'that this abject nonsense has a far larger circulation than all the rational ethnology published in England.'

Anglomania designates, among the French and German, a weak imitation of English manners and customs, or an indiscriminate admiration of English institutions. In German literature, an Anglomania was especially prevalent in the 18th century, when translations of English books became numerous, and were read with great admiration. A remarkable Anglomania prevailed in France for some time before the commencement of the Revolution, arising out of admiration of English free institutions. But another kind of Anglomania is often limited to trifles such as fashions and society manners, and in this sense is not unknown in the United States.

Anglo-Saxon Language and Literature. The term Anglo-Saxon was frequently applied, in the works of the last three centuries, to the earliest forms of the English language, up to the date of the Norman Conquest and a little later. English, in short, was described as Anglo-Saxon so long as it remained an inflected tongue, and no longer. The word, however, was never used by the people themselves who spoke that language: from the earliest times they knew themselves, collectively at least, as *Engle*, and their tongue as *Englisc* (or in Latin as *Angli* and *Lingua Anglica*). The Teutonic settlers of Southern Britain, commonly called Anglo-Saxons, were divided indeed into two main branches—one northern, the Anglians or English (in their own dialect,

Engle), who occupied the eastern coast from the Firth of Forth to the farther limit of Suffolk (see ANGLES); and one southern, the Saxons (in their own dialect, *Sæces*), who held the portion of the island from Essex to Dorsetshire, extending inland to Oxford and the Severn valley. But even the Saxons appear from the beginning to have recognised themselves in a wider sense as *Engle* too; certainly they called their language *Englisc*, and as soon as the territory under the overlordship of the West-Saxon kings acquired a general name at all, it was known, not as *Saxonia* and Saxonland, but as *Englisc* and England.

The word Anglo-Saxon was applied only at a much later date to the early Teutonic inhabitants of South Britain and their language, after the latter had become so far obsolete in form and vocabulary as only to be comprehensible by means of special study. Professor Freeman, Dr Stubbs (Bishop of Chester), Mr J. R. Green, and others strongly argue for a return to the old and true name English; and since 1867 this return has become very general in linguistic and historical works. For particulars as to the Anglo-Saxon language and literature, therefore, see ENGLISH LANGUAGE AND LITERATURE; for Anglo-Saxon history, see ENGLAND. It is probable, however, that the word Anglo-Saxon, having taken deep root in the vocabulary of every-day life, will continue to designate, in popular speech, the early inflected form of the English language, and will still more widely be employed as a general name for the Teutonic element in the ethnology of Britain, an element now so largely mixed with the Celtic as to be practically almost indistinguishable. Even as a name for the language of King Alfred it is still employed by Mr Sweet and many other eminent scholars. See Freeman's *Norman Conquest*, vol. i.; Green's *History of the English People*; Koch's *Historische Grammatik der Englischen Sprache*; Matzner's *Englische Grammatik* (trans. 1874); Sweet's *Anglo-Saxon Reader*; Grein's *Bibliothek der Angelsächsischen Poesie*; and the same author's *Bib. der Angl. Prosa*; Green's *Making of England*; and Grant Allen's *Anglo-Saxon Britain*. The only recent Anglo-Saxon Dictionary, Bosworth's (new ed. by Professor Toller), is far from a good one.

Angola is a name formerly used loosely of the whole West African coast from Cape Lopez to Benguela. But since the establishment of the Congo Free State in 1885, it should at most be used of the Portuguese West African possessions, extending from the Congo southward to Cape Frio. This region is subdivided into four governments—Ambriz, Angola in the narrower sense (capital, St Paul de Loanda), Benguela, and Mossamedes. The limit towards the interior is very vague, but the Portuguese influence, represented by military posts, extends some 1500 miles inland. The area of the whole dependency is stated at 312,000 sq. m., and its pop. estimated at 2,000,000. The coast strip is level, barren, extremely hot, and very unhealthy. Beyond is hill country, reaching a height of 3000 feet. The main rivers are the Kwanjo running north to the Congo, and the Cuabango, Cunene, running west to the Atlantic. The country is well watered on the whole, and has a luxuriant vegetation of the tropical African type. Yams, tobacco, indigo, cotton, and freely produced; but under Portuguese mismanagement the wealth of the country is undeveloped or decaying. There is some export of wax, buffalo hides, ivory, copal gum, and palm-oil. There is abundance of iron in the mountain—also copper, coal, sulphur, and petroleum are obtained. Horses and camels cannot live here; the ox is ridden, but the burden-

bearers are usually men. Angola was long notorious for its great slave-trade. The natives are Congo negroes, and belong to the great Bantu stock. In the 16th century they were mostly converted by the Jesuits to a kind of Christianity, but soon fell back into fetichism. The number of white men in Angola, mostly Portuguese, does not exceed 3000, many of whom are transported convicts, and there are some 30,000 mulattos. The Portuguese under Diego Cam discovered this coast in 1486, and soon began to settle in it; but St Paul de Loanda was not built till 1578. The finances, in spite of very heavy taxes, are most unprosperous. But the neighbourhood of the Congo Free State has inspired some attempts at reform.

Angora, or ANGWIREH (anc. *Ancyra*), capital of a Turkish province in the mountainous interior of Asia Minor, 220 miles ESE. of Constantinople. It was a flourishing city under the Persians, and was made the capital of the Roman province of Galatia Prima. It was the seat of one of the early churches, and the scene of two Christian councils held respectively in 314 and 358. Ancient remains are still to be seen, especially of a marble temple dedicated to Augustus; an inscription from it, known as the *Marmor Ancyranum*, has furnished important materials for the history of Augustus. A great battle between the Turks and Tartars was fought here in 1402. The present city has 40,000 inhabitants; its trade is mainly in the hands of the Armenians, who number 12,000.



Angora Goats.

It is famous for its breed of goats, with beautiful silky hair, eight inches long. There are two or three varieties of the breed. The animal's coat is composed of two sorts of material, one hairy, short, and close to the skin; the other longer and woolly, farther from the skin. The latter is the most plentiful and most valuable. The annual export of wool from Angora is said to have a value of £200,000. Good goats are worth £50 or £60 apiece at Angora. Of this goat's hair, often called *cashmere wool*, *cardets* are extensively manufactured, &c. Many of the animals in this region are characterised by the length and softness of their hair, especially the dogs, rabbits, and cats; but this peculiarity disappears in Europe. The Angora goat is bred for its hair, called Mohair (q.v.), in the United States and in Cape Colony, and has also been introduced into Victoria.

Angostura, capital of the province of Guayana, in Venezuela, on the right bank of the Orinoco, about 240 miles from its mouth. It is built at a pass (*angostura*), where the river is narrowed by rocks. The site is only 191 feet above the sea-level; and the Orinoco is navigable to this point for vessels of 300 tons. The town, which dates

from 1764, is the seat of a bishop. It has a brisk trade in tobacco, coffee, cocoa, indigo, cotton, cattle, hides, and tallow. In 1819 it was decreed that its name should be changed to Ciudad Bolívar, after the liberator. Pop. (1881) 10,861.

Angostura Bark, or *CUSPARIA BARK*, is the aromatic bitter bark of the *Galipea cusparia*, a native of Venezuela and other tropical countries. It derives its name from the town of Angostura, where it is a considerable article of commerce. It was first brought to England in 1788, although it had been in use in Spain since the year 1759. The *Galipea cusparia* is a small tree belonging to the natural order Rutaceæ, 12 to 15 feet high, with a trunk 3 to 5 inches in diameter. It flourishes at an elevation of 600 to 1000 feet above the sea, and its elegant white blossoms, which appear in great profusion in August, add greatly to the beauty of the scenery.

Angostura Bark is a valuable tonic in dysentery, chronic diarrhœa, and dyspepsia, but it is falling into disuse. It owes its virtues to a volatile oil, and a bitter principle, the nature of which is uncertain, to which the name Cusparia has been given. Under the name of Angostura Bitters, an essence containing angostura, canella, cinchona, lemon peel, and other aromatics, came into extensive use as a tonic; but much of what is sold is devoid of angostura, and consists mainly of cheretta or other simple tonic. Angostura contains an alkaloid called Angosturina. In the year 1804, a quantity of bark of a highly poisonous nature reached Europe, and being mistaken for Angostura Bark, gave rise to several accidents, and in consequence the use of Angostura Bark was prohibited in some countries. This spurious bark, now known as *Falsa Angostura Bark*, is obtained from the *Strychnos Nux Vomica*, the source of strychnine, and it is readily distinguished from Angostura Bark by the following simple tests: It has no smell, has a resinous fracture, cannot be split up into small laminae, has a pure bitter taste, without aromatic pungency, and when touched with nitric acid, develops on its inner surface a deep red spot, and on its outer an emerald green. Under this test the genuine bark becomes of a dull red colour on either surface.

Angoulême, the capital of the French department of Charente, and formerly of the province of Angoumois, stands 220 feet above the winding Charente, 84 miles N.E. of Bordeaux by rail. Its old town has narrow crooked streets, and it contains a fine Romanesque cathedral (1136), and a striking hotel-de-ville, with which is incorporated the remnant of the ancient castle of Angoulême, where was born the celebrated Marguerite of Navarre, author of the *Heptameron*. Ravallac was also a native. The old bastions have been converted into fine terrace walks. There are manufactures of machinery, paper, and wine, and a brisk trade in brandy. Pop. (1866) 21,961; (1886) 34,647. The province of Angoumois was in early times a county; but in the 14th century Philip the Fair took possession of it, and it became an appanage of the younger branches of the royal family. It was made a duchy by Francis I., and was sometimes bestowed upon natural sons of the French kings, such as Charles de Valois (1573-1650), son of Charles IX., a distinguished general in the reigns of Henry IV. and Louis XIII. It was given by Louis XIV. to the Duc de Berri, after whose death (1714) the title was attached to the princes of the elder Bourbon line.

Angoulême, LOUIS ANTOINE DE BOURBON, Duc O', the eldest son of Charles X. of France, and Dauphin during his father's reign, was born at Versailles on 6th August 1775. At the Revolution

he retired from France along with his father, and after some years of military studies at Turin, and abortive military operations at the head of a body of French émigrés in 1792, he joined the other royal exiles, and lived with them at Holyrood, on the Continent, and latterly in England. In 1799 he married his cousin, Marie Thérèse, the only daughter of Louis XVI. and Marie Antoinette, a woman with something of the spirit of her mother, 'the only man in the family,' in the words of Napoleon. On the recall of his uncle, Louis XVIII., he was appointed lieutenant-general of the kingdom; and when Napoleon returned from Elba, he made a weak attempt to oppose him, but he was soon deserted by his troops, and obliged to surrender. After the second restoration he was charged with the suppression of the disorders in the southern provinces, and in 1823 he led the French army of invasion into Spain. On the revolution in July 1830, he signed, along with his father, an abdication in favour of his nephew, the Duc de Bordeaux; and when the Chambers declared the family of Charles X. to have forfeited the throne, he accompanied him into exile, to Holyrood, to Prague, and to Gorz, where he died, 3d June 1844.

Angoumois, an old name for the district round Angoulême (q.v.), now part of the department of Charente.

Angra, the capital of the Azores, a seaport at the head of a deep bay on the south coast of the island of Terceira. It is a station for ships between Portugal and Brazil and the East Indies; but the harbour is very much exposed. It is the seat of the bishop; is well built, but dirty; has fine churches, and is strongly fortified. Pop. (1878) 11,070, many Jews. There is a considerable export of wine, cheese, honey, and flax. Since 1834 it has added to its name the words 'do heroísmo,' for the conduct of its citizens in the struggle against Dom Miguel (1830-32).

Angra-Pequena, a bay on the south-west coast of Africa, in 26° 27' S. lat. and 15° E. long. It gives name to the southern littoral of Great Namaqualand (q.v.), extending 200 miles from 26° S. lat. to the Orange River, or Cape Colony, and reaching 90 miles inland a sandy, waterless region, but rich apparently in metals, and enjoying a healthy climate. In 1883 Angra-Pequena was ceded by a Namaqua chieftain to Luderitz, a Bremen merchant; and next year it was taken under German protection, with all the coast to the north as far as Cape Frio, except Walvisch Bay, which belongs to England.

Angri, a town of South Italy, 17 miles N.W. of Salerno, with cotton and silk spinning, and 7110 inhabitants.

Ångström, ANDERS JOXAS, a Swedish natural philosopher, was born 13th August 1814, and in 1833 entered the university of Upsala, where he became a *privat-docent* (1839), keeper of the observatory (1843), and professor of physics (1858). From 1867 till his death, 21st June 1874, he acted as secretary to the Royal Society of Sciences at Upsala. His works embrace the subjects of heat, magnetism, and especially optics. His *Recherches sur le Spectre solaire* (Berlin, 1869) was an important supplement to Kirchhoff's great work on the Solar Spectrum. Other works were *Sur les Spectres des Gases simples* (1871) and *Memoire sur la Temperature de la Terre* (1871).

Anguilla, or LITTLE SNAKE, an English West India Island, one of the Lesser Antilles, lying 160 miles almost due E. of the eastern extremity of Porto Rico. Area, 35 sq. m.; pop. 2500. The island is long and winding in form, is very flat in surface, and contains extensive pasture for cattle

and horses. Phosphate of lime and salt are exported.

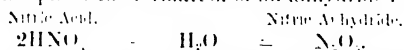
Anguilla. See EEL.

Anguis. See BLIND-WORM.

Angus. See FORFARSHIRE and DOUGLAS.

Anhalt. a duchy of the German empire, almost entirely surrounded by the Prussian province of Saxony, which breaks it up into two principal and five smaller portions. Area, 869 sq. m.; pop. (1875) 213,689; (1885) 247,603, nearly all Protestants. Dessau, Zerbst, Bernburg, Köthen, and Ballenstedt are the principal towns. In the eastern part the country is level and fertile, producing wheat, flax, rape-seed, hops, and tobacco; but the western part, approaching the Harz Mountains, is hilly and largely covered with wood, and possesses mineral wealth, especially in lead and silver. Anhalt began to be an independent principality in the first half of the 13th century. It has been repeatedly, in the course of its history, divided amongst branches of the reigning family. It was divided into three duchies in the beginning of the 17th century, but the first line becoming extinct in 1817 and the second in 1863, the whole territory was reunited into one duchy.

Anhydrides is the term now commonly given to the compounds formerly known as anhydrous acids, which was a very unsatisfactory name, seeing that these bodies do not present any of the ordinary properties of acids. In some cases they are the result of the dehydration of acids, and in all cases they represent in their composition the acid minus water. Thus, in the following equation, we give an example of the formation of an anhydride:



The anhydrides of the monobasic acids are formed in various ways; thus, hypochlorous anhydride is formed by the action of chlorine on oxide of mercury; nitric anhydride is formed by the action of chlorine or nitrate of silver, &c. The anhydrides of tribasic acids are often formed by the mere action of heat on the acids, as is the case with lactic and tartaric acids.

The anhydrides present no uniformity of appearance; for example, carbonic anhydride (commonly known as carbonic acid, which in reality is $\text{CO}_2\text{H}_2\text{O}$) is a gas; phosphoric anhydride is a white powder; nitric anhydride occurs in crystals; sulphuric anhydride is a diethyl wax like substance; while the anhydrides of the organic acids are oily bodies heavier than water.

The most important property of this class is their conversion into the corresponding acids, under the influence of water.

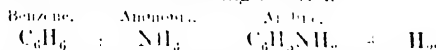
Anhydrite, a mineral, consisting of anhydrous sulphate of lime, with some slight addition of sea salt, appears in several varieties, as (1) granular, found in concretions with a foliated structure; (2) fibrous, easily broken with a fracture in delicate parallel fibres; (3) radiated, translucent; (4) sparry, or cube spar; (5) compact, of various shades, white, blue, gray, red. Anhydrite is converted into gypsum by combination with a certain proportion of water, and, where it is found in masses, as on the south of the Harz Mountains near Osterode, the surface consists of gypsum. For building, anhydrite has no great value, on account of its tendency to this change; but some of its varieties, especially the Siliceous or Alpinite, found at Vulpino, in Upper Italy, are used for sculptures, and take a fine polish. When burned and reduced to powder, it is used as a manure, resembling gypsum in its effects.

Anhydrous is the term applied to a chemical substance free from water. Thus, ordinary lime-

shell as it comes from the kiln is simply lime, CaO , without any water, and is called *anhydrous* lime; but when water is thrown upon the lime-shell, the liquid disappears by combination with the lime, which very much increases in volume and becomes *hydrated* lime, CaOH_2O . Again, ordinary stucco, before being used by the modeller, contains only lime and sulphuric acid, CaSO_4 , with no water, and is therefore anhydrous; but when water is added, and the stucco sets into its mould, it combines with two equivalents of water, and becomes hydrated stucco, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Examples of anhydrous substances are also found amongst liquids; thus, alcohol free from water is called anhydrous alcohol; and in like manner we speak of anhydrous acetic acid, anhydrous nitric acid, &c.

Ani. a ruined city of Turkish Armenia, about 25 miles SE. of Kars. In the 10th century it was the capital of the Bagratide kings of Armenia. Afterwards it was repeatedly taken and sacked, and in the 14th century it was finally overwhelmed by an earthquake. Numerous ruins of buildings and massive walls remain.

Aniline, or AMIDO-BENZENE, was discovered in 1826, as a product of the dry distillation of indigo; hence the name, derived from *anil*, the Portuguese for indigo. This source has now ceased to be of importance, for, practically, all the aniline now manufactured is obtained from coal-tar. When coal is heated in the manufacture of illuminating gas, a large number of substances are produced, and are obtained as a tarry matter of varying composition. Only a few of these bodies are of commercial importance, the chief being ammonia, carbolic acid, anthracene, naphthalene, pitch, and benzene. It is this last-named substance that yields aniline. If it is treated with strong nitric acid, an intermediate compound, nitrobenzene, $\text{C}_6\text{H}_5\text{NO}_2$, is formed, which, when mixed with acetic acid and iron filings, yields acetate of aniline. Aniline may also be prepared by passing a mixture of benzene and ammonia through a red-hot tube, after the following reaction:



Aniline may be regarded either as benzene in which one atom of hydrogen has been replaced by the group amidegen, NH_2 , or as ammonia NH_3 in which one atom of hydrogen has been replaced by the radical phenyl, C_6H_5 ; and according to the one or other view is held, it is called amidobenzene or phenylamine (see AMINES).

The pure article is a colourless oily fluid, slightly soluble in water, but readily dissolving in alcohol and ether. It refracts light strongly and possesses a weak aromatic taste. It boils at 360° F. (182° C.), and when pure, has a specific gravity of 1.020. It is a well-marked *base* (q.v.), producing numerous crystalline salts, although it has no alkaline action on vegetable colours. It is a powerful narcotic poison, its fumes causing sickness, and subsequently insensibility, while the body becomes of a livid or ashy colour. Taken internally, it soon causes death; and even when respired in small quantity, as by the workmen engaged in its manufacture, it causes severe headaches, nausea, and vomiting.

It is, however, as being the source of the numerous aniline dyes, that this body has become of leading importance.

Aniline unites with acids, forming salts, but these do not constitute the *aniline dyes*. These consist of various bases obtained by the oxidation of aniline by means of nitric acid, chlorine, arsenic, or other agents. In many instances these bases are quite colourless, and only develop their tints

when formed into salts. They may be regarded as Amines (q.v.)—i.e. ammonia in which hydrogen has been replaced by one or more radicals. Thus we have diphenylamine, $\text{NH}(\text{C}_6\text{H}_5)_2$; dimethyl aniline, $\text{N}(\text{C}_6\text{H}_5)(\text{CH}_3)_2$; methyl ethyl aniline, $\text{N}(\text{C}_6\text{H}_5)(\text{CH}_3)(\text{C}_2\text{H}_5)$; and so on. To refer at length to the various aniline dyes would be impossible, as these now number some hundreds, and we can only indicate the leading varieties. The colours produced by these dyes include every shade and tint, and the list of red or violet compounds would alone exhaust our available space. *Fuchsine*, which may be taken as typical of the red dyes, is formed when aniline is treated with strong nitric acid; but, in practice, many other chemicals may be substituted for the acid. *Blue dyes* are produced when aqueous aniline salts are treated with chlorate of potash and hydrochloric acid. *Mauveine*, a powerful violet dye, was discovered by Perkin in 1856, and this led the way in the manufacture of aniline colours. Perkin produced it by acting on aniline with bichromate of potash. We must pass over the various green, brown, yellow, and gray dyes, merely mentioning that the so-called aniline blacks are usually either very intense greens or blues, appearing black through concentration.

The aniline dyes are noted for their intense colouring power, one part of a ros-aniline salt in a million parts of water still possessing a deep crimson colour, and instantly dyeing a skein of silk moistened with vinegar. Even in so dilute a solution as one grain dissolved in 1500 gallons of water, it is capable of dyeing a silk thread immersed in it for twenty-four hours.

Many of the dyes exhibit complementary colours (see LIGHT) when looked at by reflected and transmitted light; thus, the strong solution of the salt above referred to looks a purple red by transmission, and a brilliant green by reflection. Light; a fact familiar to the users of an aniline red ink, or an ink for any of the familiar 'graph' copying processes. Here the pen assumes a green shining appearance, quite different from the colour of the ink. Aniline dyes are used as lacquers for cheap toys, being readily soluble in spirit varnish, the well-known 'bronzing liquid' being an example of this. Mixed with gelatin or collodion, and allowed to dry in thin sheets, they furnish the thin transparencies so much used for producing stained glass imitations. They have been also used for colouring wines and sweetmeats, but as arsenic was formerly or is still employed in the manufacture of the red varieties, this practice is not unattended by risk. The use of arsenic has of late been largely abandoned; or, when new makers take care to eliminate the arsenic at the end of the process, so that the final product is innocuous. Numerous cases of skin eruptions have been traced to the wearing of red flannel or red stockings dyed by aniline dyes. The readiness with which any housewife can dye articles of clothing or household ornaments has made them great favourites. The chief drawback lies in the fugitive nature of many varieties, but notwithstanding there is a wide field still open to them. The aniline colours are as a whole disapproved from the artistic point of view. Some of them are especially objectionable when used in the same textile fabric along with natural dyes. Notwithstanding this, the introduction of aniline dyes is said to have closed half the dyers' shops in India. A few years ago the Shah of Persia prohibited the importation of these colours into that country. Further details about aniline dyes are given under the head DYE-STUFFS. Although England and France were first in the field, Germany took up the manufacture with so much zeal and scientific skill that it soon surpassed its competitors, pro-

ducing superior shades of colour. Germany is now the headquarters of the industry, its products being of the highest class and the lowest price. The produce in Germany is estimated to be a third greater than that of France, and three times that of England; while the annual value of English aniline colours may amount to a million and a half. See Perkin, 'On the Coal-tar Colours,' in *Nature*, vol. XXXII.; and *The Chemistry of the Coal-tar Colours*, by Benedikt (Eng. trans. 1886).

Animal. The popular classification of all bodies into three 'kingdoms'—the animal, the vegetable, and the mineral—only assumed authority in comparatively recent times, and has done much mischief in exaggerating the apparent differences between plants and animals on the one hand, and in obscuring the fundamental distinction between these and minerals on the other. There are in reality only two kingdoms of nature, the living and the non living—the organic and the inorganic. The famous aphorism of Linnaeus, 'Stones grow; plants grow and live; animals grow, live, and feel,' is no longer satisfactory, for growth is of two distinct kinds. While growth in minerals takes place merely by *accretion*—addition of new particles to the external surface, that of living matter is by *intussusception*—the interposition of new molecules between those formerly present. Again, living matter, or *protoplasm*, is clearly distinguished by its chemical composition, it being composed of very highly complex compounds, or mixture of compounds of carbon, nitrogen, hydrogen, oxygen, and sulphur, together with water and salts. During life, it is incessantly *disintegrating* and combining with the oxygen of the atmosphere, many products of change, chiefly carbonic acid, water, and nitrogenous waste being evolved; and *reintegration* must therefore take place by intussusception, for which purpose new matter containing the necessary elements must be taken up, either from other organisms or from the

also exhibited by all forms of living matter—that is to say, each arises as a detached portion of some previous organism; develops into a form similar to that from which it arose; tends to reproduce itself; and, finally, ceases to live, when its protoplasm breaks up, and its elements ultimately return in a highly oxidised state to the inorganic world. Moreover, certain conditions of temperature, pressure, presence of oxygen &c., variable only within comparatively slender limits, are essential to the maintenance of life.

While living bodies are thus clearly distinguishable from inorganic, every attempt to erect a similarly sharp distinction between plants and animals completely breaks down. Vast numbers of animals are destitute of the power of locomotion, so that, for instance, corals were unhesitatingly referred to the vegetable kingdom until about a century ago; while diatoms, and many embryonic algae and fungi, which possess marked powers of locomotion, would thus require to be ranked as animals. Nor is sensibility a purely animal characteristic; the well-known sensitive plant, the sun-dew, and Venus's fly-trap, exhibiting it in the most marked degree. Cellulose, again, which forms the coating of the vegetable cell, was regarded as completely characteristic of this; but many algae and fungi are naked at some period of their lives, while the sick external tunic of those degraded vertebrates known as Ascidians has essentially the chemical composition of plant cellulose. Chlorophyll, the green colouring matter of plants, is absent from fungi and from many flowering parasites, and is yet present in infusorians, in Hydra and some other invertebrates, which are thus enabled to vegetate in sunshine, forming starch and evolving oxygen.

Animals thus do not necessarily feed; while the well-known insectivorous plants (see *DIONÆA*, *SUN-DEW*) capture animals, and frequently digest them.

The attempt to establish a difference in structure is equally unsuccessful; for although the students of higher forms have no difficulty in grouping their flowers and ferns, their birds and beasts, into distinct series, the microscopist finds that these two great stems arise from a common root. It has therefore repeatedly been proposed to divide living forms into three groups—Animals, Plants, and *Protista*—a solution which, while decidedly gaining adoption on account of its great service in treating together the lowest forms hitherto separated as Protozoa and Protophytes, of course raises minor difficulties—that of distinguishing on the one hand between Protists and Animals, and on the other, between Protists and Plants. And thus every attempt to limit and define its forms has really resulted in proving the fundamental unity of life. The general study of the phenomena of life constitutes the science of Biology, of which the sub-sciences are usually reckoned as four: (1) Morphology, dealing with the structure of organisms, and including Anatomy and Embryology; (2) Distribution, dealing with the time and place of their occurrence on the earth; (3) Physiology, dealing with the study of their functions; (4) Etiology, dealing with the explanation of the preceding facts by the rival hypotheses of Creation and Evolution. These subjects are divided between botanist and zoologist, and their labours, while starting, as has been shown, from a common point, thence diverge widely. The results of Animal Morphology are outlined in the articles ZOOLOGY, VERTEBRATA, &c.; and those of the study of Animal Physiology under the heads of the separate functions, DIGESTION, NUTRITION, REPRODUCTION, &c. See also GEOGRAPHICAL DISTRIBUTION, EVOLUTION, &c. For Animal Intelligence, see INSTINCT.

Animal Chemistry. The objects of animal or physiological chemistry are, to investigate the composition and properties of protoplasm and its various modifications which form the tissues and organs of living beings, and to ascertain the precise nature of the constructive and destructive changes which take place in those tissues and organs during the performance of their functions.

Protoplasm is always found to contain much albuminous or proteid matter, together with smaller quantities of amyloids and fat, and its molecule is conjectured to include representatives of all these three classes. Much water is also present, together with small quantities of numerous products of functional activity. We may briefly refer to these.

Proteids (q.v.) are at present classified as follows: (1) Native Albumens (egg, serum, &c.); (2) Derived Albumens (acid and alkali albumens, casein); (3) Globulins (globulin, myosin, vitellin, &c.); (4) Fibrin; (5) Coagulated Proteids; (6) Peptones; (7) Lardacein. Certain nitrogenous bodies allied to proteids are mucin, chondrin, gelatin, keratin, nuclein, &c., which form the principal components of mucus, cartilage, &c., connective tissue, epidermic structures, and cell nuclei respectively.

The **Amyloids**, or carbo-hydrates, from their far less complex structure, are much better understood. The most important of these are grape-sugar (glucose, dextrose, diabetic sugar), $C_6H_{12}O_6 + H_2O$; milk-sugar (lactose), $C_{12}H_{22}O_{11} + H_2O$; muscle-sugar (inosite), $C_6H_{12}O_5 + 2H_2O$; glycogen or animal starch, $C_6H_{12}O_6$; and dextrine, $C_6H_{12}O_6$.

The **fats**, with their derivatives and allies, form a very complete series, acid, neutral, and nitro-

genous, of which the composition is tolerably well known. The acetic acid series, $C_nH_{2n}O_2$, is best represented, including formic (in blood and many tissues, also secreted by ants, &c.); acetic (in stomach during fermentation of food, in diabetic urine, &c.); propionic (in sweat, &c.); butyric (in milk; also sweat, urine); valerianic (in feces); caproic, caprylic, and capric (in butter); laurostearic and myristic (in spermaceti, &c.); palmitic and stearic acid (in human fat). Of the oleic series, $H(C_nH_{2n-3})O_2$, many members are known. Human fat is a mixture of oleic, palmitic, and stearic acids in combination with glycerine. The glycolic acid series is represented by lactic acid, the oxalic series supplying oxalic and succinic acids. Cholesterolin is abundant in nervous tissue and in bile, &c. The complex nitrogenous fats are lecithin, neurin, cerebrin, &c.

The most important product of nitrogenous waste in mammalia is urea, $(NH_2)_2CO$, which forms the chief solid constituent of urine, and occurs in traces in blood and most tissues, except muscle, which, however, contains intermediate products of decomposition. Little is yet known of its relations to the proteids, from which it arises; but Schützenberger has succeeded in decomposing albumen into carbonic anhydride and ammonia in the same ratio as urea, and therefore concludes that the molecule of albumen is a complex ureide. Uric acid, $C_5H_4N_2O_6$, predominates in the urine of birds and reptiles, but it is also present in small quantities in that of mammals, and its salts form gouty and uricary concretions. Creatin, creatinin, and sarkin occur constantly in muscle; xanthin, guanin, &c. in urine; glycocholl and taurin in combination in the bile acids, &c.; leucin and tyrosin, as products of pancreatic digestion.

Most of the preceding substances, though seldom constant, appear to be of exceedingly wide distribution throughout the animal kingdom. A few substances, including several of the more important proteids, grape-sugar, muscle-sugar, peptic and diastatic ferments, are also of frequent occurrence in the vegetable kingdom; while some of the most important and characteristic vegetable compounds also occur incidentally among animals (e.g. cellulose, chlorophyll, and starch). The whole progress of research tends to show the fundamental unity, not only of the composition of animal and vegetable protoplasm, but also of most of the processes of waste and repair in animals and plants alike. Thus for instance, it has been proved by analysis that allantoin, a body analogous to urea, and known as an important waste product of the vertebrate embryo, is also found in quantity in opening buds in spring. Cholesterolin, too, has been prepared from carrots, while pepsin can be obtained alike from the stomach, from the plasmodium of a myxomycete, or from the digestive secretion of an insectivorous plant.

See PROTOPLASM, also BLOOD, BONE, MUSCLE, &c.; DIGESTION, NUTRITION, RESPIRATION, &c.; also FAT, UREA, ALBUMEN, PROTEID, &c.; *Gaussen's Physiological Chemistry*, and Foster's or other modern *Text-book of Physiology*.

Animalcule, a term which, although etymologically applicable to any very small animal, is limited in ordinary language to those which are microscopic. Animalcules exist in prodigious numbers, their size being such that myriads of them find ample space for all the movements of an active life within a single drop of water. Sea-water often contains them in enormous numbers, and the luminosity of the sea is often due to this cause (*Noctiluca*). At length, contrary to a widely diffused belief, they occur only in very small number in drinkable waters, they abound wherever

water becomes stagnant, or contains decomposable organic matter. Thus rain-water allowed to stand long in an open cistern, or the water of a vase in which cut flowers are placed, soon becomes more or less turbid and offensive; and if a drop be placed on a slip of glass and examined, even with a pocket lens, a multitude of living beings can be seen moving rapidly in all directions, while minute specks are also to be seen in motion between these. On the application of higher microscopic power, new organisms come again into view, so that the variations of size between the invisible inhabitants of one drop are as great as those between whales and minnows. An immense variety of animalcules can very easily be studied by collecting impure water from a dozen different sources, and keeping it separate in open wide-mouthed bottles in a window, and observing from time to time; for not only do the contents of the different vessels differ from each other, but they also vary greatly with the season, so that an unending source of new surprises is thus open to the most inexperienced microscopist without leaving his room. Besides obtaining numerous varieties of microscopic algae, diatoms, bacteria, &c. (see ALGÆ, DIATOMS, PROTOPHYTES), examples of all the leading forms of minute animal life are thus to be obtained; and these, at first supposed to belong to the same general type of structure, are now known to be extremely varied. The simplest form which the observer will meet is a naked lump of jelly-like protoplasm, constantly flowing into new shapes, the *Amoeba* (q.v.); while other masses of jelly, the *Foraminifera* (q.v.), may be found possessed of coverings of sand, or even carbonate of lime, and only protruding their irregular processes (pseudopodia) through its opening. Others, again, the sun animalcules of fresh water, and the Radiolarians, which inhabit the sea, are provided with a beautifully marked bony skeleton. These groups are usually united under the head of Rhizopoda (q.v.). Another great series, in which the form of the animal is usually definite, the pseudopodia being generally replaced by vibratile threads or cilia, are named the Infusoria (q.v.). All these are equivalent only of a single cell of higher animals, and are therefore grouped into the sub-kingdom Protozoa, but many animalcules are of far more complex organisation. Thus the abel animalcules (see ROTIFERA) are segmented, worm-like animals; and the larva of almost all marine and fresh water invertebrates are at an early stage free-swimming and microscopic. From its extreme vagueness, therefore, the term animalcule is now disused by scientific writers.

Despite their apparent insignificance, certain animalcules, by virtue of their almost imperishable skeletons, are among the most important agencies which have built up the crust of the earth. The surface of the sea is largely inhabited by Radiolarians and Foraminifera, the former preponderating in cold, the latter in temperate and tropical water. As they die, their skeletons sink to the bottom, and form mud or ooze, which through time and pressure becomes consolidated into rock. Many polishing stones, &c. are thus mainly composed of Radiolaria; while chalk is principally formed by the skeletons of Foraminifera, and greensand of internal siliceous casts of these. Many limestones, marbles, quartzites, &c. are probably of similar origin, although all trace of organic structure may have been eliminated by metamorphic change. See PROTOZOA, PROTOPHYTES, and other articles named above; also an adequate work on microscopy—e.g. Carpenter *On the Microscope*, and the *Micrographic Dictionary*.

Animal Heat. Living protoplasm is constantly in process of disintegration and oxidation, and these changes are accompanied by evolution

of heat. The greater the activity of change, the higher does the temperature tend to become. Not only, therefore, are the so-called cold-blooded animals really warmer than the surrounding atmosphere, but even plants recognisably evolve heat, and the temperature of certain flowers, where protoplasmic activity is highest, may sometimes almost reach that of the human body. See ARUM.

Even the infusoria evolve heat, as is shown by the slowness with which the surrounding water freezes. John Hunter showed that worms and leeches, slugs and snails, were all one or two degrees warmer than the air. Fishes generally are only two or three degrees warmer than the water they inhabit; but in some of the more active, like the bonito and tunny, a temperature of 99° F. has been observed, while the surrounding water was at 80½°. So, too, the frog, which usually averages about 1° warmer than the air, is 2° or 3° warmer while breeding; while in certain lizards and snakes, a difference of as much as 15° to 20° F. has been recorded. Newport's researches on insects show that while the temperature of the larva may vary from 1° to 4° above that of the atmosphere, that of the pupa is almost imperceptibly higher, and that of the perfect insect may rise enormously; a difference of from 2° or 3° at rest, to from 9° to 20° in excitement, having been observed in individual bees, and a much more marked elevation in the temperature of the whole hive, which has been observed to reach 102° F. Among the animals commonly termed warm-blooded, the temperature, although generally higher in birds than in mammals, varies from species to species, yet is very nearly constant during health in each. Thus, while the average temperature of the human body is about 98·4° F., that of the wolf is 3° or 4° lower, and that of the arctic fox 5° or 6° higher. In birds, the temperature varies from 100° in the gull and other aquatic birds, to nearly 112° in the swallow, while, on the other hand, a hibernating mammal like the lemming becomes temporarily cold-blooded, its temperature during the winter sleep being comparatively little above that of the atmosphere.

From the preceding details, it will be seen that while cold-blooded and warm-blooded animals thoroughly agree in evolving considerable amounts of heat, the difference between them lies in this, that in the former the means of loss of heat by the skin, &c. are great as compared with the normal production of heat, while in the latter the loss and production of heat are kept balanced.

Physiologically considered, the animal body is a machine for converting the potential energy supplied by food into the actual energy of heat and mechanical work. What Aristotle simply referred to the heart, and mechanical physiologists to the friction of the blood, and so on, is now simply regarded as one of the results of the disintegration of the complex protoplasm. Knowing the quantity and chemical composition of the food, it is easy to calculate the amount of energy furnished to the body. The average income of energy of the human body on normal diet is about 1,000,000 metre-kilogrammes of which about 150,000 units can be expended in muscular work, the remaining 850,000 leaving the body in the form of heat. As to the channels by which heat leaves the body, Helmholtz has calculated that fully 2½ per cent. leaves the body with the fluid and solid excreta, about 5½ per cent. is spent in warming the expired air, about 14½ in evaporating the water expired by the lungs, and the balance, about 77½ per cent., by the skin, in conduction, radiation, and evaporation.

These general considerations once grasped, the apparent anomalies and variations in the temperature of different animals present no difficulty.

While heat is given off by the oxidation of the living matter of all the tissues, the greater part is the result of the activity of the muscular and glandular systems, and especially of the former.

For the lower or cold-blooded animals, the varying temperature is simply and directly associated with the varying amount of protoplasmic waste, and this again with the varying activities of the organism. The case of higher or warm-blooded animals (mammals and birds) presents, however, greater difficulty, since here the temperature remains practically constant throughout life (neglecting slight diurnal and seasonal variations, or the more serious perturbations due to the excitation and depression of the vital processes in various diseases). Some regulative mechanism must here be present, operating on the one hand to insure the regular maintenance of a minimum temperature, on the other to check its undue rise in periods of exceptional activity. This problem has been the subject of much physiological research, and is not yet fully exhausted; its essential solution is, however, due to Claude Bernard, whose *Chaleur Animale* (1876) may be taken as a centre round which the literature of the subject arranges itself.

The regulation of heat is on the one hand automatically effected by the variations in the quantity lost in warming the breathed air, in the flow of blood through the skin, and in perspiration. Thus if more air be passed in and out of the lungs in a given time, or if the vaso motor nerves allow the skin blood vessels to dilate and admit of a larger flow, or if perspiration increase, the body will become cooler, and *vice versa*. But on the other hand, there is every reason to believe from the researches of Hoppe-Seyler, Liebermeister, and others, that the production of heat through the activity of muscles and other organs is controlled by means of a special heat regulating and nervous mechanism. Engleberg and Landors have demonstrated a certain area in the brain, which, when stimulated, affects the temperature of the body. See PHYSIOLOGY, TEMPERATURE OF THE BODY.

Animal Kingdom. See ANIMAL, ZOOLOGY.

Animal Magnetism, MESMERISM, or HYPNOTISM. From time immemorial, Egyptian conjurers and sorcerers have been accustomed to produce artificial somnambulism, usually by inducing their subject to gaze intently for a few minutes at certain cabalistic signs marked on the centre of a white plate. The Yogins, Hindu ascetics, also practise similar arts; while the peculiar states of trance or ecstasy into which the Mount Athos monks and other religious fanatics were accustomed to throw themselves are of kindred nature. So, too, many allusions in the works of classical authors relate to phenomena more or less of this kind.

About the middle of the 17th century, while the phenomena of terrestrial magnetism were attracting considerable attention, one Valentine Greatrakes, in London, professed to cure disease by stroking with the hand. A century later Gassner, a Swabian priest, employed a similar mode of treating disease, which he ascribed to demonic possession. About 1774, Mesmer, a Viennese physician, commenced to treat diseased organs by the application of artificial magnets. The phenomena exhibited by his patients, especially the more nervous of them, led him to adopt the idea that the magnets operated not as special sources of influence, but as conductors of a magnetic fluid which he could communicate at will to the patient, even at a distance. Four years later, he commenced practice in Paris, with great success. His usual methods were to seat his patient with his

back to the north, to press the pit of the stomach, and make passes with his hands in front of his face, meanwhile fixing his patient's eye, and soothing him by the aid of music. Sometimes too he placed his patients in connection with 'magnetised' trees, or set them in a circle around a covered vessel from which he professed to conduct the invisible fluid, thus inducing peculiar nervous conditions. In 1785 a royal commission was appointed to examine Mesmer's pretensions. These investigators found that the same phenomena could be produced in Mesmer's more nervous patients when blindfolded, by merely inducing them to suppose themselves in the neighbourhood of any of Mesmer's magnetic appliances, though none were really present; while conversely, magnets and magnetic trees were alike powerless, if the patient were kept unaware of their proximity. The Marquis de Puységur at the same time discovered that he could induce artificial somnambulism without the aid of magnets, by passes alone; but unfortunately for further investigation, the subject fell into the hands of the arch quack, Cagliostro (q.v.), and thus became extremely discredited by physiologists. Despite the unfavourable report of the French commission of 1785, as well as of a later one in 1831, and other subsequent exposures, vague theories of magnetic influence, odic force, new imponderable substance, electrobiology, or the like, kept constantly recurring, since science had nothing with which to replace them, until the investigations of James Braid, a Scottish surgeon settled in Manchester. In 1841 he went to a mesmeric seance, which seemed to him a mere triumph of imposture over credulity; but returning on another occasion to watch the details more narrowly, he was struck to find that the patient was really unable to keep his eyes open. After some reflection, he concluded that by continuous staring, the eye with their nerve centres became fatigued, and the balance of the nervous system was thus destroyed. Resorting to experiment, he at once succeeded in throwing his servant and others into thorough mesmeric sleep by simply inducing them to gaze intently for a few minutes at the mouth of a bottle placed above, but close to, the eyes. He thus proved the absolute dependence of the mesmeric phenomena upon the physiological condition of the patient, not on that of the operator; and found that he had here to deal with a new order of cerebral states, henceforth to be classed with those of sleep, somnambulism, and insanity. He therefore proposed the word hypnotism, which now so advantageously replaces the terms animal magnetism and mesmerism. Braid continued to investigate the subject with great thoroughness and success for some years, and attempted the treatment of certain diseases by inducing hypnotism. Unfortunately, however, the evil reputation which the subject had so naturally obtained, prevented the due appreciation of Braid's discoveries, and it was not until about 1875 that the subject concerned to be thoroughly investigated by physiologists. Preyer and D. Leibniz in Germany, and Riens in France, have continued and extended Braid's results, and we may therefore briefly sum up their observations, premising that no scientific observer has yet confirmed the statements of mesmerists as to clairvoyance, reading of sealed letters, influence on unconscious persons at a distance, or the like; and, as above stated, the influence of the mesmerist is unnecessary, and in many cases quite unimportant.

The physiological changes which are set up are usually as follows: A spasm of the accommodating apparatus first takes place, the pupils meanwhile dilating, and the eyeballs being protruded, while the eyelids droop. Respiration and

circulation become greatly accelerated, and perspiration frequently ensues. Finally, profound stupor may follow. A very remarkable degree of insensibility to pain exists, so that even surgical operations may sometimes be performed as well as under chloroform. The reflex irritability of all the voluntary muscles is greatly increased (indeed for days after the experiment), so that stroking an area of skin produces a spasm of the subjacent muscles, which may even spread over the whole body, producing a perfectly cataleptic rigidity, so that Heidenhain indeed considers the hypnotic state as nothing more than an artificially produced catalepsy. These considerations indicate the danger of repeatedly subjecting the same person to hypnotic experiments, lest the abnormal state should be rendered permanent. Moreover, since in some persons the hypnotic state begins with general convulsions, the non-medical reader is warned against attempting to hypnotise.

During hypnosis, consciousness is diminished or dormant. The patient may, if only slightly affected, remember what has happened; if more fully hypnotised, he has no remembrance of his actions until hints are given; in the most complete state, he has no remembrance whatever. In hypnosis, however, sensory perceptions take place; but these are not converted into conscious ideas—in other words (as constantly happens in a 'brown study'), the sensation is present, but the power of directing the attention towards it is temporarily lost. Reflex action, however, goes on all the more freely in the absence of the inhibiting will; and thus movements made before a hypnotised person are perceived by the imperfectly closed eyes, and the stimulation of the organ of sense sets up a material change in the central nervous system, which liberates movements, apparently voluntary, yet not really so. Thus the patient may be induced to imitate every movement, however absurd or trivial, which is presented to him. The tendency to mimicry, so common especially in children, monkeys, parrots, &c., is thus intensified, or rather the intensity of the sensory impression is allowed to work unchecked.

As sometimes in ordinary sleep, but here with ease and certainty, dreams may be induced. Thus the medium may be conducted through all the stages of a journey, may be plunged into grief or raised to exuberant happiness by a few judicious suggestions. This state is nearly related to that of 'auto-suggestion at command,' where the medium obeys orders like a doleful dog. Thus, as a crucial experiment, Heidenhain ordered his brother, a young medical student, to turn off his whistle, the product of a year's assiduous cultivation, to the unbounded vexation of the unfortunate youth on awaking. So too, placing the body in a given position calls up the appropriate actions. A pillow, properly placed in the medium's arms, is raised like a baby; music makes him dance; and so on. In all cases, the spoken command, the position of the limbs, or the sensory stimulus, sets up the impulse to the actions indicated, without either intelligence or volition being awakened.

The patient never falls down, and the power of co-ordinating the movement of walking, &c., is nearly perfect; his attitudes have often an unusual grace, and in the lighter stages of hypnosis he may converse freely and even with unworldly intelligence and emotion, due, doubtless, partly to freedom from the restraint of a knowledge of the surroundings, partly to the concentration upon a single train of thought. Very sensitive patients may be hypnotised by monotonous sounds like the ticking of a watch, or even by expectant attention, when alone.

Numerous other remarkable phenomena have

been described. Thus, by gentle pressure on the neck of a patient, he can be induced to repeat words spoken in his presence, especially when the sounds are directed to a sensitive area just below the sternum. Automatism at command is greatly facilitated by imposition of the operator's hand on the patient's head. By passes on one side, catalepsy or paralysis of the opposite side only can sometimes be induced. Remarkable disturbances of the sensation of colour may take place; and so on.

The state of the brain during hypnosis is not as yet well understood. The activity of the ganglion-cells of the cerebral cortex (with which the functions of consciousness are believed to be specially associated) appears to be inhibited by the gentle prolonged stimulation. Additional light is being obtained by experiments upon animals, of which many can be thrown into a state closely resembling, if not identical with the hypnotic.

Hypnotism is again coming into use in medical and surgical practice, and its facts have very important bearings on the phenomena of reverie, trance, somnambulism, religious excitement, mania, and spiritualism. There is reason to suspect also that the conventional surroundings and processes of education are not free from a pernicious tendency to produce and operate on essentially sub-hypnotic states of the pupils. Considerable light is being thrown upon the normal processes of cerebration, from the action and mode of correlation of the senses up to those of imagination and reasoning. See Braid's *Maget, Animal Magnetism*, &c. (3d ed. 1842); Figuier's *Histoire du Magnétisme* (1860); Heidenhain's *Animal Magnetism* (1880); Binet and Fere, *Animal Magnetism* (International Science Series, 1886).

Animals. CRUELTY TO. England has the honour of first forming societies for its prevention, and of first legislating for its punishment. The English Society for the Prevention of Cruelty to Animals was founded in 1824, the Scottish in 1839. The Fellowship of Animals Friends was organised in 1879, with the Earl of Shaftesbury as president. In the United States above thirty branches of a similar organisation were founded between 1866 and 1881; and the movement has extended into France and Germany.

Bear baiting and bull baiting were put down by law in 1835; and the drawing of carriages by dogs within London by an act of 1839, afterwards extended to the rest of the country. Under the statutes passed in 1843, 1849, 1854, 1861, and 1876, cruelty to domestic animals is punishable by fine and imprisonment. To kill, maim, or wound cattle is punishable with penal servitude for fourteen, or not less than seven years. A penalty of £5 attaches to the ill-treating or torturing of any animal. Before this, injury to animals, even when malicious, such as houghing cattle, was punished only as an offence against property, and it is still so punishable. These Cruelty Acts are supposed to apply to tamed beasts in menageries. The acts prohibit bull baiting and dog or cock fighting, and apply important regulations to the slaughter of cattle and their conveyance by rail. Working horses with painful sores is an offence which unhappily has frequently to be prosecuted. Attempts have been made to abolish by law the cruelties connected with the fashionable amusement of shooting pigeons let loose from cages; and the friends of the horse agitate to do away with the cruel use of bearing-reins. In the way of kindness to animals, mention should be made of homes for stray dogs and cats; the dogs' home in London was founded in 1861. See VIVISECTION.

Animals. WORSHIP OF, according to most students of comparative religion, is a stage in the

An'ima Mundi, according to many of the early philosophers, a force or vital principle immaterial, yet not intelligent; inseparable from matter, but giving it its form and movement, the source of all physical and sentient life. Plato held it impossible for pure spirit—the atmosphere in which alone eternal and archetypal ideas could exist—to bear any relation whatever to matter, and he therefore supposed the latter to be operated upon by an intermediate agency, the *anima mundi*. In the system of the Stoics, it was conceived to be the sole vital force in the universe; it usurped the office of pure spirit, and the doctrine became indistinguishable from Pantheism (q.v.). The notion does not seem to have been entertained by the schoolmen, but it reappears in the writings of Cornelius Agrippa, Paracelsus, and Van Helmont, and, in a modified form, was held by More and Cudworth. The latter recognised in 'plastic nature' the universal agent of physical phenomena. Amos Comenius found argument from Gen. i. 2 to prove that the spirit that 'moved on the face of the waters' still gives life to all nature. The doctrine of the immaterial *anima*, in matter, but distinct from it, was upheld by Stahl in 1720; but his term *anima* has now been adopted with a much wider application by Dr Tylor and other anthropologists with few exceptions. See ANIMISM.

Anima, a resin exuding from the trunk of the tree *coubaril*, a large tree of the natural Leguminosæ, sub-order Casalpiniceæ, a native of Spain and Brazil. It somewhat resembles gum, to which, in France, the name *résine animée* is applied, but is more easily soluble in alcohol. The name *anime*, or gum anime, is, however, also given in Britain to a resin called in India copal, the produce of *Fateria indica*, a tree of the natural order Dipterocarpaceæ; whilst the copal of Madagascar is produced by *Hymenocera verrucosa*, and that of Brazil in great part by several species of Hymenocera, a tree of which genus is also regarded as the probable source of the copal of Mexico.

Animism, a term originally used to denote the theory of Stahl (q.v.), which regarded the vital principle and the soul as identical, but now used in the sense given to it by Dr Tylor as the general doctrine of spiritual beings. Dr Tylor takes the belief in spiritual existence as a minimum definition of religion. It appears among all low tribes with which we have any intimate acquaintance; and all travellers who have hitherto asserted the existence of races without it have been afterwards refuted by the facts. It may be considered to have arisen simply from the evidence of the senses, interpreted by the crude and childlike science of the savage. Two problems seem to have exercised the primitive mind. First, What is it which makes the difference between a living body and a dead one? what causes waking, sleep, trance, disease, and death? In the second place. What are those human shapes which appear in dreams and visions? The savage makes these two groups of phenomena each help to account for the other, by combining both in the conception of an apparition or ghost soul, which is conceived of as an insubstantial human image, resembling a vapour or a shadow, the cause of life and thought in the individual it animates, capable of leaving the body and appearing to men waking or asleep as a phantasm separate from the body of which it bears the likeness, and able to enter into, possess, and act in the bodies of other men, of animals, and even of things inanimate. When the sleeper awakens from a dream, he believes that his soul has really been away, or that the souls of others have come to him. His body has been still, but his living self or soul, his phantasm or image, has been active. And have

not waking men, in broad daylight, sometimes seen these human phantoms in what are called visions or hallucinations; and after a man has died and been buried, has not his phantasm-figure continued to appear to the survivors in dreams and visions? And what is his reflection seen in still water, or his shadow falling behind him, or the breath seen for a moment issuing from his lips like a faint cloud, but the man's ghost-soul becoming visible for a moment and vanishing again? In the thought of the savage, as of the child, personality is ascribed not to men and beasts only, but also to things. His ghosts do not come to him naked, but dressed in the well-known clothing worn in life. This is the explanation of one of the most wide-spread rites of animistic religion—the offering of funeral sacrifices for the service of the dead. The phantasmal images of the objects offered pass into the possession of forms shadowy like themselves—the souls of the dead. These spiritual beings fill all nature, animate and inanimate, and their life is a continuation and not a new life in savage religion. They transmigrate into human beings, animals, plants, and lifeless things, and they can avenge their past and present wrongs by bringing disease upon the offender. The man keeps after death the temper he had in life, and is powerful for good or evil according to his inclinations while alive. From this, and not from mere family affection, arises naturally the ancestor-worship which has been from remote antiquity, and is still, the main faith of the larger half of mankind. Above the commonalty of such spirits the primitive mind recognises higher spirits, or gods. Sometimes, by an extension of the natural order of life, the souls of great chiefs and warriors continue the same superior rank into the unseen world, and rise to divine honours. And the idea of the divine ancestor may even be carried far enough to reach supreme deity, as when the Zulus, working back from ancestor to ancestor, reach Unkulunkulu, the Old-old-one, as the creator of the world, thus attaining to monotheism by a natural evolution. In the most rudimentary stages of religion, ethical conceptions are but feebly developed, and there is little trace of moral retribution after death. The gods require their worshippers to perform his duty towards them, but do not necessarily concern themselves with his doing his duty to his neighbour. Yet the practical effect of religion on men's lives early begins to show itself. The worship of the dead naturally encourages good morals, for the ancestor who, while alive, saw that the members of his family did right by one another, and whose condition in the spirit-world is a continuation of his earthly character and rank, will naturally insist on this being continued when he is a divine ghost, powerful to favour or to punish. The world thus becomes regarded as the battle ground of good and evil spirits, and from this follows naturally the idea of a dualism, or perpetual contest between good and evil, ranged under a supreme good and a supreme evil deity, which attains so great development in the ancient religion of Persia.

Animism, then, appears to the savage, on the evidence of his senses, to be a rational and fairly consistent philosophy, and it has maintained its place in higher civilisations. It is taught by Lucretius, when he makes his theory of film-like images of things (*scintillæ* and *membræ*) account both for the apparitions which occur to men in dreams and the images which impress their minds in thinking; and when Democritus explained the facts of perception, by declaring that things are always throwing off images of themselves (*eidola*), which enter the recipient soul, he was simply answering the fundamental question of metaphysics, by turning to a new purpose, as a method of explaining the phenomena of thought, the savage doctrine of object-

souls. Animism is not a degeneracy from a higher culture. In it we find no survivals which show inconsistencies with itself; whereas, in all higher cultures, there occur survivals of primitive superstition, wholly inconsistent with the more advanced beliefs. Most primitive superstitions are found surviving, in modified form, in poetry and folk-lore, and often in common words and phrases, which have a meaning deeper than metaphor. Animism is not itself a religion, but a sort of primitive philosophy, which not only controls religion, but the whole life of the natural man. It represents a stage in the religious evolution which is still represented by the so-called Nature-religions, or rather by the polydemonistic magic tribal religions, early developed among civilised nations into polytheistic national religions resting upon a traditional doctrine. See Tylor's *Primitive Culture* (2 vols, 1871), on which this article is mainly founded; also *The Origin of Primitive Superstitions*, by Rushton M. Dornin (Philadelphia, 1881).

Anio, the ancient name of the Teverone, a tributary of the Tiber, which rises in Monte Cantaro, and joins the larger river 3 miles above Rome. Its beautiful cascade at Tivoli (the ancient *Tibur*) is celebrated by the classical poets. Owing to the purity of the stream, Rome was from 270 B.C. supplied with water from it by means of two aqueducts.

Anise (*Pimpinella anisum*), an annual plant of the natural order Umbelliferae. Two species are natives of Britain; they are commonly known by the name of Burnet Saxifrage, and have no properties of importance. Anise proper is a native of Egypt. It is cultivated in Egypt, Syria, Malta, and Spain, and even in Germany, especially in the district around Erfurt, where a large quantity of the seed is annually produced. Attempts were made, more than 200 years ago, to cultivate it in England; but the summers are seldom warm enough to bring it to perfection. It is occasionally sown in gardens for a garnish or for seasoning. Anise seed (*aniseed*) is used as a condiment and in the preparation of liqueurs; also in medicine as a stimulant stomachic, to relieve flatulence, &c., particularly in infants. It has an aromatic, agreeable smell, and a warm, sweetish taste. Its properties are due to a nearly colourless or sometimes blue volatile oil, called *Oil of Anise*. *Anise-water*—water flavoured with the oil, and sugared—is much used in Italy as a cooling drink. The plant called anise in the New Testament is supposed to be *Anethum graveolens* (see DILL).

STAR ANISE, or **CHINESE ANISE**, is the fruit of *Illicium anisatum*, a small evergreen tree of the natural order Magnoliaceae, somewhat resembling a laurel. It receives its name from the star-like form of the fruit, which consists of a number (6 to 12) of hard, woody, one-seeded carpels. It is held in high estimation by the Japanese, and planted near temples. The whole plant is carminative, and is used by the Chinese as a stomachic and as a spice in their cookery. The qualities of the fruit, seed, and oil closely resemble those of the common anise, and the oil is imported for the same purpose. Star aniseed is also imported, chiefly from China and Singapore.

Anjou, a former province in the NW. of France, of about 3500 sq. m. in extent, now forming the department of Maine-et-Loire, and small parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. It lies on both sides of the lower course of the Loire, where it receives the Maine. Its capital was Angers (Lat. *Andegavorum*). The ancient inhabitants of Anjou were the *An legari*, who long and resolutely resisted the Roman arms. The first Count of Anjou was Fulk the Red, who was made count for his services against the North-

men in the 9th century. The male line of the ancient Counts of Anjou having become extinct in 1060, their title and possessions passed by the female line to the powerful House of Gâtinais; and from one of this family, Geoffrey V., Count of Anjou, sprung the Angevin house of English kings, usually called Plantagenets, the last of whom was Richard II. Geoffrey conquered the greater part of Normandy, assumed the title of duke, and in 1127 married Matilda, the daughter of Henry I. of England, and widow of the Emperor Henry V. Through her, his son inherited the English throne, which he ascended in 1154 as Henry II. Anjou now became one of the possessions of the kings of England; but in 1205 the French acquired it by fortune of war; and it was bestowed as a fief upon Philip, the son of Louis VIII., and afterwards upon his brother Charles, who became the founder of that house of Anjou which gave kings to Naples and Sicily. Charles II. of Naples gave Anjou to his daughter Margaret on her marriage with Charles of Valois, the son of Philip IV. Her son ascended the throne of France as Philip VI. in 1328. King John in 1360 made Anjou a duchy, and gave it to his son Louis, and on his succeeding to the crown of Naples, it remained a possession of the kings of Naples till the overthrow of that dynasty by René II., when Louis XI. permanently gave it to the French crown (1481). Subsequently it was merely an honorary title to princes of the family—as, for example, the grandson of Philip XIV., who became Philip V. of Spain. Anjou was united with England for a short time during the reigns of Henry V. and Henry VI.—the latter king ceding it finally in 1444.

Ankarström, JOHN JACOB, the assassin of Gustavus III. of Sweden, born in 1762. The son of an officer of rank, he came very early to court as a page, and next entered the royal body-guard, but retired as early as 1783, and settled in the country. Being opposed to the measures taken by the king for entailing the power of the senate and of the nobles, he became involved in certain intrigues in the island of Gothland, and was tried for treason, but released for want of positive evidence. Soon after he formed a plot with a ring of discontented nobles to murder Gustavus, and the lot to commit the dastardly deed having fallen on Ankarström, the old life-guardsmen wounded the king mortally with a pistol-bullet at a masked ball on the 15th March 1792. Ankarström was executed on the 27th April, after having been publicly flogged for three successive days.

Anker, a Dutch liquid measure, formerly often referred to in England, containing $\frac{1}{16}$ of a wine gallon.

Anklam, a town of 10,000 inhabitants, in the province of Pomerania, on the navigable river Peene, 4 miles from its mouth in the Baltic. It has long been a place of commercial importance, having been a member of the Hanseatic League from the 14th to the 16th century. It has manufactures of iron, sugar, and soap. During the middle ages, Anklam suffered sorely from fire and pestilence; and in the 17th and 18th centuries it was again the theatre of several sieges and sacked. On the close of the Seven Years' war, in 1762, its fortifications were destroyed, and there is a military school here. The Hanseatic architecture, very like the Flemish, is still to be seen. Pop. (1875) 11,847; (1885) 12,784.

Ankobar, the capital of the kingdom of Shoa, in Abyssinia, is built 8200 feet above sea-level, and consists of 3000 huts scattered over the summit and western slopes of a mountain. When the king is in residence the population increased from 6000 near 15,000.

Ankylo'sis (Gr. *ankylōsis*, 'bending' or 'crooking'; *ankylō*, 'stiff-joint') is a term used in surgery to imply a stiffness in any joint. It is usually the result of disease, which destroys either the articular cartilages, leaving two bony surfaces opposed to each other, to become united by subsequent formation of bony or fibrous tissue, or thickens and shortens the natural fibrous tissues around the joint. Severe injury may also lead to a similar result. If the bond of union be osseous, the joint is perfectly rigid; if fibrous, it may allow a certain amount of motion. Some joints, especially the elbow, are very apt to become ankylosed; and in the knee or hip-joints, osseous ankylosis, with the limb in a proper position, is frequently the most favourable termination to disease, as the limb can then afford a rigid support for the trunk. Joints, stiff through a fibrous ankylosis, may be forcibly bent, and the bond of union ruptured, so as to restore mobility, or allow of their being placed in a convenient position. In some joints, especially the elbow, ankylosis may be remedied by excision of the joint. Ankylosis of the joints between the ribs and the vertebrae is common in advanced age; and there are some cases on record of universal ankylosis of all the joints. A case occurred in 1716 of a child only twenty-three months old with all its joints thus stiffened; and there are in various museums specimens of adult bodies in this condition.

Ann, or **ANNAT**. See **ANNATES**.

Anna, or **ANNE**, ST, according to tradition, wife of St Joachim, and mother, after twenty years of barrenness, of the Virgin Mary, the mother of Jesus. The first to mention her is St Epiphanius, in the 4th century; but towards the 8th, we find her all but universally held in honour. Her body is said to have been transferred from Palestine to Constantinople in 710; and since that time many churches have boasted of relics of her person, no less than three having equally good claims of having her head. She is the patron-saint of carpenters. Her festival falls on the 26th of July; with the Greeks, on the 9th of December. St Anne d'Aray, in Brittany, is a famous place of pilgrimage; and St Anne de Beaupré, near Quebec, is its counterpart in the New World.

Anna, an Indian coin, value nominally 1d. sterling, but always the sixteenth part of a rupee.

Annaberg, a mining town of Saxony, on the northern slope of the Erzgebirg range, 31 miles S. of Chemnitz by rail. It is situated 1800 feet above sea-level, in a mining district; the surrounding hills containing mines of silver, tin, cobalt, and iron. It has extensive manufactures of lace, silk ribbons, corsets, and buttons. The ribbon manufacture was introduced here by Protestant refugees from Belgium in 1590. The mining industry was more important in the 16th century. Pop. (1885) 13,822.

Anna Carlovna, regent of Russia during the minority of her son Ivan, was the niece of the Empress Anna Ivanovna (q.v.), and in 1739 married Anton Ulrich, Duke of Brunswick-Wolfenbüttel. Her son Ivan, born in 1740, was nominated by the Empress Anna as her successor; and Anna Carlovna proclaimed herself regent, but showed no capacity. A conspiracy took place in 1741; the infant Ivan was murdered; and Anna and her husband were imprisoned at Chelmskoy. Here she died in 1746; while Anton was confined till his death in 1776.

Anna Comnena, a learned Byzantine princess, author of one of the most valuable of the Byzantine histories, was the daughter of the Emperor Alexius I. (Comnenus), and was born on December 1, 1083. She received the best education that

Constantinople could give, and early displayed a fondness for literary pursuits; but was also habituated from her childhood to the intrigues of the court; and during the last illness of her father, she entered into a scheme, which her mother, the Empress Irene, also favoured, to induce him to disinherit his eldest surviving son, John, and to bestow the diadem on her. Failing in this, she framed a conspiracy against the life of her brother (1118); and when her husband, Nicephorus Bryennius, a Byzantine nobleman, either from timidity or virtuous principle, refused to join in it, she passionately lamented that she had not been born a man, and upbraided him for having the soul of a woman. Her brother spared her life, but confiscated her property, which, however, he soon after generously restored. Disappointed and ashamed, she withdrew from the court, and sought solace in literature. On the death of her husband (1137), she retired into a convent, where she died in 1148. Her life of her father, entitled *Anna Comnena Alexiadis libri XIX.*, is full of professions of careful inquiry and a supreme regard for truth, the effect of which is weakened by 'the perpetual strain of panegyric and apology.' The style is characterised by an elaborate affectation of rhetoric. The best edition is that of Schopen and Reifferscheid (2 vols. 1839-78). See Oster's *Anna Comnena* (3 vols. 1868-71).

Anna Ivanovna, Empress of Russia, born in 1693, was the second daughter of Ivan, elder brother of Peter the Great. She married in 1710 the Duke of Courland, who died in the following year; and she obtained the duchy of Courland for her favourite, Biron (q.v.), a Courlander of low birth. The throne of Russia was offered to her by the Supreme Council on the death of Peter II. in 1730, on conditions which greatly limited the power of the monarchy, but which she soon broke. She declared herself autocrat, and suppressed an attempt of the nobles to establish a constitutional government; and her paramour, Biron, having determined to govern the nation as well as the empress, established a reign of terror through the land. He is said to have banished not less than 20,000 persons to Siberia; many were broken on the wheel. Prince Dolgoruki and others of the highest rank perished on the scaffold. Anna died in 1740, and left the throne to her grand nephew, Ivan.

Annals. These were at first books which contained a record, in chronological order, of the principal events occurring in one or more years. The name is derived from the oldest historical documents of the Romans, the *Annales Pontificum*, or *Annales Maximi*, the duty of drawing up which devolved upon the *Pontifex Maximus*; but these were all destroyed by the Gauls at the sack of Rome, nearly four hundred years before the time of Christ. After the second Punic War, the *Annales Gentium* and *Annales Consularis*, of families or individual public men, continued to be composed by educated members of the Roman laity, such as Fabius Pictor and Calpurnius Piso. At a still later period, the term was applied to any historical work that followed the order of time in its narrations, separating them off into single years - as, for instance, the *Annals* of Tacitus.

Annam, a territory along the east coast of Indo-China, between 10° and 23° N. lat., forming an empire which, since 1885, has been under a French protectorate. The names Annam and Cochinchina are sometimes used as interchangeable; sometimes the whole region is Annam, with Tongking (Tonquin) and Cochinchina as subdivisions; and conversely, sometimes Cochinchina has Tongking and Annam for its northern and southern

sections. Cochin-China was the name originally given by the early navigators to the whole coast from Siam to China. Annam, a name given by the Chinese in the 3d century A.D., was adopted by the Annamese as the official name for the whole country. Including Tongking—till recently a fendatory state—Annam is bounded on the north by the Chinese provinces of Kwangtung, Kwang-si, and Yunnan. On the west, the precise frontier of Annam is still undetermined, but may be taken generally as formed, in the northern section, by the mountain-range skirting the left bank of the Mekong, but farther south, extending beyond that coast-range to about 106° E. long. On the S., Annam is bounded by Lower Cochin-China; on the E., it is washed by the China Sea. The area of Annam is estimated at about 106,000 sq. m., and its population at about 21 millions. It consists of three main parts—the northern part, Tongking, or Tonquin (i.e. 'Eastern land'), occupying from 60,000 to 70,000 sq. m., with a population of about 12 millions; Dang-kong ('interior land'), or Annam Proper, south of Tongking; in the extreme SE., Champa or Tsampa. In addition to these sections, Annam includes the domain of the Moi, or hill-tribes (called by the Siamese, Kha), differing from one another in type, speech, and usages, situated to the west of the Dang kong; as also the territory of the Laos, subject to Annam, lying north of Cambodia and the Mekong. French, or Lower Cochin-China, to the south of Annam, consisting of six provinces, was in 1863 detached from Annam, and is now under the administration of the French Marine Department. Cambodia, occupying the lower course of the Mekong, to the SW. of Annam, was, till recently, under the vassalage of Siam; but since the French occupation of Lower Cochin-China, Cambodia too has detached itself from Siam, and declared allegiance to the French.

Tongking, placed by the treaty of Hué (1884) along with Annam Proper under the protection of France, is distributed into three distinct natural divisions—(1) the delta-land in the SE.; (2) the region of plateaus in the north; and (3) the forest region in the west. The Song-coi, or Red River (called Thao by the Annamese, and Hong-kiang by the Chinese), flows across the whole of Tongking from NW. to SE. The delta-lands formed at its mouth may be defined as a rough insular triangle, the apex of which is Son-tay, and its two sides, Song-dai on the south, and Song-can on the north, both issuing into the sea. Not far below Son-tay the Song-coi opens out at intervals into four leading branches, of which one is navigable for large ships. These main water-ways are connected by a network of subsidiary channels—many natural, some in part artificial. The delta-lands are all crossed by great embankments or dykes, hundreds of miles in extent, often 60 to 70 feet wide at the base, 20 to 30 feet high, and broad enough at the top for three carriages to drive abreast. The delta-lands are extremely fertile, yielding two harvests a year. This fertility is due to the red soil which is transported by the Song-coi (Red River), and which is rapidly enlarging the delta. Hanoi, a seaport when built by the Chinese in the 3th century, is now 100 miles inland. Now, too, there are populous agricultural villages where, 20 years ago, fishermen were casting their nets. The staple product is rice; but there are also grown peanuts, castor oil, mulberry for silkworms, cotton, sugar-cane, spices, sweet potatoes &c. The north of Annam is rich in minerals of all kinds, and there have been opened gold, silver, copper, tin, and salt mines, while extensive coal-fields have hardly yet been touched.

The mountains are covered with all kinds of useful woods.

Though Annam lies wholly in the torrid zone, yet the climate of Tongking is on the whole excellent. During the dry season, from September to April, the thermometer varies between 70° and 40° F. During the hot and rainy season, extending over the other six months, the thermometer seldom mounts from a minimum of 70° to beyond 100° F. On account of the moisture, however, the heats in June and July are sometimes almost intolerable. In the mountains of Annam, tigers, buffaloes, rhinoceroses, and elephants abound. Much fishing is carried on.

Inhabitants. The Annamese are mainly of Mongoloid stock. The inhabitants of the mountains (Muong or wild people) are taller, fairer, and stronger than the inhabitants of the plain. The latter are small of stature, but well proportioned, indolent, but expert. Rice is their principal food; but, like the Chinese, they are omnivorous, and devour snakes, locusts, rats, and dogs. The Tongkingese display wonderful skill in building dykes. Yet at Haiphong, the Chinese have monopolised all the industries demanding skill and perseverance; and 'lazy as an Annamese' is a common proverb. The only good industries carried on in Annam are in lacquer and the finer metals. The manufacture of steel is unknown. Sericulture and silk-weaving are far behind the state attained by those arts in China. The dykes offer the most available roads, and the only two great high-ways are the route from Saigon through Hué to Hanoi, and by way of Bac-ninh and Lang-son to China; and the northern road from Hanoi to Son-tay and Hung-hoa. The speech of the Annamese is monosyllabic, like Chinese, from which they have borrowed many words. The Annamese written character was also derived at an early period from the Chinese alphabet. There is no Annamese literature distinct from the Chinese. The mass of the people worship tutelary spirits; Confucianism is in vogue with the more cultivated; the remainder adhere to Buddhism. There are besides about 420,000 Roman Catholics, descendants of emigrants from Macao and Japan (1624), and of Portuguese fugitives from Malacca.

Government.—The frame of government is of Chinese pattern, but in its operation is much harsher and ruder than its prototype. The emperor is absolute despot, and unless the actual monarch should have decreed otherwise, the succession passes to the eldest son. He is assisted by a council of six ministers and three 'kum,' one of whom is prime-minister. The bastinado is in full force, and mutilation and torture are regular instruments of arbitrary authority. Military service is obligatory on all men between the ages of 18 and 60; and they are so often called out, that the field-work is left principally to women. The capital of the empire is Hué.

History. Tongking and Cochin-China were, 214 B.C., conquered by China, and occupied by Chinese colonists. In 938 A.D. Tongking freed itself from the yoke of China, and in 1403 a war commenced, which in 1428 ended with Annam's independence of China, although the latter still maintained a nominal suzerainty. In 1517 the Portuguese came to the country, followed by the Dutch, who established a trading settlement in Hanoi. In 1789, by the aid of the French, the emperor of Annam united Tongking and Cochin-China under his rule. In 1858 a Franco-Spanish squadron stormed Touran, and next year Saigon likewise surrendered. In 1861 the whole province of Saigon submitted to France. Other provinces soon fell, and by the treaty of Saigon or Hué (1862) 'Cochin-China' was established, and afterwards enlarged.

In 1870 Dupuis made a voyage up the Sang-coi as far as Yunnan; and in 1873, with 100 French soldiers, captured Hanoi. By commercial treaty (1874) with Annam, France secured the right of holding the delta-lands of Song-coi, and freeing them from pirates. Accordingly, in 1882, Major Rivière made himself master of Hanoi, and, notwithstanding the protests of China, Annam, by treaty on the 25th August 1884, acknowledged the suzerainty of France, and her right to regulate the relations of Annam with foreign powers, China included. After some conflicts with France, China also, by the treaty of Tien-Tsin, 9th June 1885, engaged to respect the new state of affairs introduced by France into Annam, and to sanction commercial relations between China and Tongking. Thus practically the whole of Annam, including Tongking and Cochinchina, has been made a dependency of France.

See recent works on Annam and French Cochinchina by Bouillevaux, De Rhins, Lemaire, Lamay; and works on the French colonies by Vignon, Rambaud, and De Lançassan (1886).

Annamaboe, a small seaport town, protected by a strong British fort, on the Gold Coast of Africa, 10 miles E. of Cape Coast Castle. It has a good landing-place, and is a free port, but there is little trade. Pop. 5000.

Annan, a small seaport, and royal and parliamentary burgh, in Dumfriesshire, on the river Annan, near its entrance into the Solway Firth, 18 miles ESE. of Dumfries by rail. It is neat and well built; among the chief industries are tanning and bacon-curing. Edward Irving was a native; and Carlyle, as a schoolboy, led 'a doleful and hateful life' at the academy. The burgh unites with Dumfries, &c. in returning one member to parliament. Pop. (1881) 3366.

Annapdale. See DUMFRIESSHIRE.

Annapolis, a seaport of Nova Scotia, on an arm of the Bay of Fundy, 95 miles W. of Halifax by rail. Its harbour is large and sheltered, though somewhat difficult of entrance. Annapolis is the oldest European settlement to the north of the Gulf of Mexico, having been established, in 1604, by the French as the capital of their province of Acadia, under the name of Port Royal. Acadia was ceded to Britain by the French in 1713, when Port Royal changed its name in honour of Queen Anne, continuing to be the seat of government, till in 1750 it was superseded by the newly founded city of Halifax. Pop. (1880) 2833.

Annapolis, the capital of Maryland, U.S., stands on the south bank of the river Severn, 2 miles from its entrance into Chesapeake Bay, and 40 miles E. by N. of Washington by rail. It has an air of quiet seclusion, more like a European town than an American city. Among its edifices are an imposing state-house, St John's College (1784), a Roman Catholic seminary, a naval hospital (1871), and a United States naval academy, established in 1845. Pupils remain in this institution for four years, previous to examination and admission into the navy as midshipmen. Founded as Providence in 1649, Annapolis received its present name in honour of Queen Anne. Pop. (1870) 5744; (1880) 7000; (1887) about 10,000.

Ann Arbor, a flourishing city of Michigan, capital of the county Washtenaw, on the Huron River, 38 miles W. of Detroit by rail. It was settled in 1824, and incorporated as a city in 1851. The state university, founded 1837, possesses a good library, a notable observatory, and a laboratory. There are about 90 professors and lecturers and 1500 students, and the income from grants and fees is about £46,000. There are several faculties, and, as in Europe, examinations for

degrees are conducted on work done out of class. The city has an active trade, and contains manufacturing of carriages, furniture, paper, woollen goods, blinds, and ploughs. There are mineral springs and a hydropathic establishment. Pop. (1870) 7363; (1880) 7849, about one-fourth of whom are of German descent.

An'ates, or FIRST-FRUIT, in the ecclesiastical law of England, meant the value of every spiritual living for a whole year, which the pope, claiming the disposition of every spiritual benefice within Christendom, reserved out of every living. This impost was at first only levied from persons appointed to bishoprics, but was afterwards extended to the inferior clergy. It was abolished in 1534, and in the following year the right to annates was annexed to the crown. The fund thus arising was administered for the benefit of the Church of England. It was transferred to the governors of Queen Anne's Bounty, and afterwards to the Ecclesiastical Commissioners. For the purposes to which it is now applied, see ECCLESIASTICAL COMMISSIONERS.

ANNAT, or **ANN**, in Scots law, signifies the half-year's stipend payable for the vacant half-year after the death of a clergyman, to which his family or nearest of kin have right, under an act of the Scottish parliament passed in the year 1672. It is a right that does not belong to the clergyman himself, but to his next of kin absolutely, and therefore can neither be assigned or disposed of by him nor attached for his debts.

Annatto, or **ANATTA**, also known in commerce as *Arnatto*, *Roucou*, and *Orbetta*, is the reddish pulp surrounding the seeds of the *Bixa orellana*, a medium-sized tree growing in Guiana and other parts of South America. The fruit having been bruised and macerated with water, the juice is allowed to stand till the colouring matter subsides to the bottom (an operation hastened by the addition of vinegar), when it is strained and the residue dried. Sometimes fermentation is allowed to take place, when an article superior for dyeing purposes, but having a disagreeable odour, is produced. Annatto is used in the dyeing of cloth, to which it imparts a bright orange tint, of slight permanence, however; and it also enters into some bright coloured varnishes. It is in the manufacture of butter and cheese that it finds its widest application, although its value in this respect is purely a sentimental one, depending on the taste for a high-coloured article. As met with in this country, it contains flour, chalk, and other foreign substances, which, however, can hardly be regarded as adulterants, being necessary to adapt the crude article to its various uses.

Anne, Queen of Great Britain and Ireland, and the last British sovereign of the House of Stuart, was born at St James's Palace, London, on 6th February 1665. She was the second daughter of James II. of England and VII. of Scotland (who at the time of her birth was Duke of York), by his first wife, Anne Hyde, the daughter of the famous Earl of Clarendon. When she was six years of age, her mother died; and her father soon after professed himself a member of the Church of Rome; but his daughters were educated in the principles of the Church of England, to which Anne always retained an ardent if not a very enlightened attachment. In 1683 Anne was married to Prince George of Denmark (1653-1708), an indolent and good-natured man, who concerned himself little about public affairs, and had as little capacity for dealing with them. Soon after her marriage, the wife of Colonel Churchill (afterwards the famous Duke of Marlborough) was appointed one of the ladies of her bed-chamber. As the queen

needed some one on whom she could lean, Lady Churchill speedily became her intimate friend, and acquired supreme influence over her, which she exerted in favour of her husband. In their correspondence with each other, Anne went by the name of Mrs Morley, and Lady Churchill by that of Mrs Freeman. During the reign of her father, Anne lived in retirement, taking no part in politics. On the landing of the Prince of Orange, she soon joined his party, the Churchills having decided on that step. She consented to the act by which the throne was secured to the Prince of Orange in the event of his surviving her sister Mary; but quarrelled with her sister about questions of etiquette, and was afterwards drawn into intrigues in which the Churchills were engaged, for the restoration of her father, or to secure the succession of the throne to his son. She even entered into a secret correspondence with her father. She was herself childless when, on the death of William III., on 8th March 1702, she succeeded to the throne. She had borne, indeed, seventeen children; but only one, the Duke of Gloucester, survived infancy, and he died in 1700, at the age of 11. The influence of Marlborough and his wife was most powerfully felt in all public affairs during the greater part of her reign. The strife of parties was extremely violent, and political complications were increased by the queen's anxiety to secure the succession for her brother. In so far as she had any political principles, they were opposed to that constitutional liberty to which she owed her occupancy of the throne. These principles and her family attachment tended to alienate her from the Marlboroughs, whose policy, from the time of her accession, had become adverse to Jacobitism, and who now, along with Godolphin, were at the head of the Whig party. The duchess also offended the queen by presuming too boldly and haughtily upon the power which she had so long possessed. In 1710 they parted, never to meet again. Anne found a new favourite in Mrs Masham, a cousin of the duchess, who herself had introduced her into the royal household. To Mrs Masham's influence the change of government in 1710 was in a great measure owing, when the Whigs were cast out, and the Tories came into office, Harley (afterwards Earl of Oxford) and St John (Lord Bolingbroke) becoming the leaders of the ministry. But, although concurring more or less in a design to secure the succession of the throne to her brother, the new ministers had quarrels among themselves which prevented its successful prosecution, and kept the poor queen in a state of constant unrest. She died 1st August 1714. The Elector of Hanover succeeded her as George I.—The public events of her reign belong to the history of Britain; but the union of England and Scotland, in 1707, may be mentioned in its personal relation to herself, as she was the last sovereign who reigned over these as separate kingdoms, and the first sovereign styled of Great Britain. Queen Anne was of middle size, and comely, though not beautiful. She was virtuous, conscientious, and affectionate, more worthy of esteem as a woman than of admiration as a queen. Her reign is often mentioned as a period rendered illustrious by some of the greatest names, both in literature and science, which this country has ever produced; but literature and science owed little to her active encouragement.

Anne Boleyn. See **BOLEYN**.

ANNE OF AUSTRIA, daughter of Philip III. of Spain, was born in 1601, and in 1615 became the wife of Louis XIII. of France. The marriage was so far from being a happy one that the royal pair lived for twenty-three years in a state of virtual separation—a result due chiefly to the influence of

Cardinal Richelieu, whose fixed determination to humble the House of Austria led him to spare no means for alienating the affection of Louis from his queen. On the death of the king in 1643, Anne became queen-regent, but disappointed the parliament and the nobility, who had hoped to secure again their ancient authority, by choosing as her minister Cardinal Mazarin, under whose strong and skilful management the young king (Louis XIV.) came, on attaining his majority, into possession of a throne firmly established on the ruins of contending parties. The character of Anne had much influence in moulding that of her son. She had, however, no capacity for actually managing affairs, and on the death of Mazarin, retired to the convent of Val de Grace, where she died in 1666.

Annealing. When a slab of glass or metal is allowed to cool down rapidly from its melted state, the constituent particles near the surface become differently arranged from those in the interior. The molecules next the skin are in a different state of tension from those inside. Annealing is a process of slow cooling of a body from a high temperature, by which there is secured a more or less uniform arrangement of the particles or molecules throughout its mass. Glass is in this way made strong and able to resist changes of temperature. The mere dropping of a small angular fragment of some hard substance, such as flint, into a glass vessel before it is annealed, usually makes it fly to pieces. A still more striking example of the unstable nature of unannealed glass is seen in Prince Rupert's drops. These are drops of glass which have fallen in a melted state into cold water, and have assumed a tadpole-like shape. If the point of the tail of one of these be nipped off with the fingers, the whole of it will fall into dust with a loud explosion. This shows that whenever the skin is broken, the particles beneath it are acted on by a repellent force, and fly away from one another.

An annealing kiln or oven is usually of some length, and the glass vessels or sheets placed in it are raised to near their melting-points at its hottest portion, and then moved away at intervals to cooler and cooler parts of the chamber. It takes twelve hours to anneal wine-glasses, but much longer for large objects. Plate-glass requires to be two weeks in the kiln before it is properly annealed. Badly annealed glass shows itself in numerous ways. A basin of thick glass left in an ordinary room will sometimes break spontaneously during a cold night. Plates of glass placed, on account of their apparent strength, in floors to admit light to cellars, have occasionally cracked to pieces during sharp frost. Hot water, as is well known, often breaks tumblers.

Metals under various circumstances require to be annealed. Hollow ware (q.v.) of cast-iron, before it can be turned bright for tinning, must be softened by the annealing process. The old way of doing this was a rough and ready one. Large and strong iron pots which contained the ware were placed on gratings in the open air, and the whole covered over with coke, all interstices both within and without the pots being filled up with coal dust, to prevent as far as possible the access of air. The coke was then fired and kept at a red heat for about twenty-four hours, after which the pile was allowed to cool. For many years, however, hollow ware has been annealed in an oven not much unlike that used for glass. Large iron-castings are kept covered up in their moulds, to prolong the time of cooling—sometimes with hot cinders—for a month or more. Like thick glass, these occasionally break spontaneously.

What are called malleable-iron castings are articles usually of limited size, made of cast-iron, which are afterwards annealed. They are covered over with powdered hematite ore, and subjected to

various degrees of heat for about ten days, when they become quite malleable.

Metals, when undergoing the process of rolling, hammering, or stamping, require annealing. In the manufacture of sheet-brass, the rolling, by which it is gradually reduced in thickness, makes it so hard that it has to be annealed several times during the operation. But in this case the annealing is conducted in a reverberatory furnace, and lasts only a few minutes. The sheet-brass is simply raised to a blood-red heat and then withdrawn, this being sufficient to restore the ductility of the metal. Articles made of brass and other metals by stamping, and particularly such articles as require many blows of the stamp to bring them into shape, are repeatedly annealed during the process. In the case of coins, as they receive only one blow of the coining-press, the metal blanks are annealed before they are stamped. A steel matrix, from which die-punches are impressed, being usually a work of much labour, is put through the annealing process after every few blows in the die-press. German silver, which is composed of three kinds of metal, is difficult to anneal from its tendency to crack in the process.

Annealing is also used in gold-beating, in wire-drawing, in nail-making, and many other arts. Tin, lead, and zinc are annealed by the use of boiling water, and steel tools by immersion in hot oil, both liquids being allowed to cool slowly. Many experiments have shown that steel boiler-plates and ship-plates are made stronger by annealing them in oil, or in melted lead, or by simply heating them to redness in a slow furnace, and afterwards covering them up with sand or ashes to prevent them cooling rapidly or unequally. Tempering (q.v.) has been called the inverse process of annealing.

Anneey, chief town of the French department of Haute-Savoie, at the north-western extremity of the Lake of Annecy, 22 miles S. of Geneva, and 25 miles NW. of Aix-les-Bains by rail. The Lake of Annecy, 1426 feet above the sea, is about 9 miles long; its waters flow by the Pier to the Rhone. Annecy was transferred with Savoy to France in 1860. It has manufactures of linens, cotton yarn, silks, straw goods, and steel wares. The most remarkable buildings are the castle, once the residence of the Counts of Geneva, and now a barrack; the old bishop's palace; the cathedral (1523); the hôtel-de-ville, with a statue near it of Berthollet (q.v.) by Marchetti; and the modern church of St. Francis, which possesses relics of St. Francis of Sales. Here Eugene Sue died in exile. Pop. (1881) 10,740.

Annelida (Lat. *anellus*, 'a little ring'), a term due to Lamarck, and definitely applied by Cuvier to the higher red-blooded worms. The term is no longer generally used in classification, but where it does persist, it usually includes the three classes - Chaetopoda, Discophora, and Gephyrea. See Worms.

Annexation is the adding or joining to a state of territory which was previously independent or in possession of another power. It is generally, though not always, the result of war. As important annexations in recent times may be mentioned that of Oudh in 1856, which was one of the causes of the Indian mutiny; that of Savoy by France after the war with Austria in 1859; that of Alsace-Lorraine by Germany in 1871; that of the Bolivian seaboard and part of Peru by Chili in 1884; and that of Upper Burmah by Britain in 1886.

Annobon, or ANNABON, the smallest of the four islands in the Bay of Biafra, the eastern part of the Gulf of Guinea, now belonging to Spain. Its volcanic mountains render it picturesque, and it is well wooded and fertile. It has

an area of over 6 sq. m., and a pop. of about 1600 negroes, who profess to be Catholics. The island was discovered by the Portuguese on New-Year's Day (*Anno Bom*), 1471.

Annonay (ancient *Annonitacum*), a town of the department of Ardèche, France, 37 miles S. of Lyons. The chief manufacture is that of paper; there are also manufactures of gloves, silk and cotton twist, and woollen cloths; and bleaching is carried on. The paper-mills of Annonay were established by the father of the celebrated aeronauts Montgolfier (q.v.), who were born here. The situation of the town is picturesque. Pop. (1881) 14,891.

Annual, a term applied to plants which complete the whole course of their development in one season, within which they germinate, flower, perfect their seeds, and perish, never to spring again from the same root. The whole duration of life in the plants thus designated is indeed generally much less than a year, and in temperate and cold climates falls within the brief period of the summer months. Some species are generally annual, and others generally biennial; but whether an individual plant is annual or biennial often depends upon the accidental circumstance of the season at which the seed germinates, and may therefore be artificially determined by the time of sowing. Peculiar circumstances also sometimes convert annual into biennial, or even perennial plants; and those which are mere annuals in one climate, are perennial or even shrubby in another—e.g. the Castor-oil plant. Most kinds of corn are the produce of annual grasses; some of which, however, as wheat, in certain circumstances, prove of longer duration. The *annuals* cultivated in our flower-gardens are very numerous; and many species, both native and foreign, are among our most beautiful flowers.

In Gardening, annuals are divided into three classes—viz. *hardy*, *half-hardy*, and *tender*. The last named are those which can only be cultivated in the temperature of a stove or greenhouse, and consist of such as the Cockscorn (*Colasia cristata*), the Melon (*Cucumis melo*), and many others. The half-hardy class consists of those kinds that, while they will flower and perhaps perfect their seeds in the open air, need the assistance of artificial heat and protection in the early stages of their growth. The China Aster (*Callistemma hortense*), Tobacco (*Nicotiana tabacum*), Drummond's Phlox (*Phlox drummondii*), and Marigold (*Tagetes*), are familiar examples of this class of annuals. The first named or hardy class is composed of those that may be sown in the open ground, and will germinate and flourish from first to last without any artificial protection or aid. Nemophila Lupine (*Lupinus nanus* and others), the Large-flowered Flax (*Linum grandiflorum*), Candytuft (*Paris umbellata* and others), the various Godetias, Gillias, and the Rocket Larkspur (*Delphinium ajacis*), are well-known members of the hardy group. So hardy are many of these that they may be sown in autumn and bloom the following spring, thus greatly prolonging the enjoyment of the flower-garden, as these will last in bloom till the ordinary spring-sown plants come in.

Californian annuals are unquestionably the most valuable for those who must rely solely on hardy flowers for the adornment of their gardens.

Annual Register, a yearly record of public events, which was commenced in 1759, and has been continued to the present time. It was projected by Robert Dodsley the bookseller, and for nearly thirty years Edmund Burke wrote the survey of events. Indexes have been published at various periods, and the work is now published by Messrs Rivington. Preceding works of the same kind were Boyer's *Political State of Europe* (1711-39),

and the *Historical Register*, a quarterly (1716-38). A rival work, entitled *The New Annual Register*, was started in 1781 by Dr Kippis. It was edited after his death by Dr Morgan, and came to a close in 1825. The *Edinburgh Annual Register* (1808-27) had among its contributors Sir Walter Scott and Southey. The French *Annuaire Historique* (1818-49) was superseded by the *Annuaire des Deux Mondes*, a publication connected with the well-known review of that name.

Annals, the name given to a class of sumptuous books, much in demand during the first half of the present century, for Christmas, New-year, and birthday presents. They were usually illustrated with good engravings, and often contained prose and poetry by most of the best writers of the day. The first of them, the *Forget-me-not*, was begun in London in 1822. The following year, two others made their appearance, *Friendship's Offering* and *The Graces*, the latter containing a series of elegant poems on the Months by the Rev. Dr Croly. The *Literary Souvenir*, however, commenced in 1824 by Mr Alarie A. Watts, was the first really beautiful book of this kind, and after its appearance the annals became every succeeding year more and more attractive. It was followed by the *Amulet*, started by Mr S. C. Hall, and edited by his wife; the *Winter's Wreath*, a provincial annual; and the aristocratic *Keepsake*, commenced in 1827 by Mr Charles Heath, an eminent engraver. The last was published at a guinea, instead of the usual twelve shillings of former annals, and was throughout one of the most successful of its class. Its first editor was Mr W. H. Ainsworth, and among his successors were Lady Emmeline Stuart Wortley and the Countess of Blessington. In its second year, Scott refused the editorship at a salary of £800, but had £500 for a few contributions. The first volume of

Book of Beauty, begun in 1833, and long one of the best of the series, was written by Letitia E. Landon; its second and all succeeding issues by the Countess of Blessington. Other annals were the *Picturesque Annual*, *Hood's Comic Annual*, the *Children of the Nobility*, the *Juvenile Album*, the *Musical Bijou*, the *Drawing-room Scrap-book* (the last edited at first by Letitia E. Landon, afterwards by Mrs Howitt, and latterly by Mrs Norton), *Juvenile Scrap-book*, the *Oriental Annual*, *Historical Annual*, the *Gift*, and the *Taken*; last three, American productions. For several

years, nearly £100,000 per annum was expended in the production of annals, and 150,000 copies of them were yearly sold. The sale of the *Forget-me-not* alone was at one time 20,000 copies. In 1829 no fewer than seventeen were published. In 1840 their number had dwindled to nine. From this time the demand for the annals steadily declined. Publishers no longer found them safe speculations, and gradually discontinued them. They dropped out, one by one, like spent rockets, from the literary firmament. The *Literary Souvenir* had been discontinued in 1834, after the publication of ten volumes. The *Forget-me-not*, the first in the field, saw its twenty-second year. The *Book of Beauty* and the *Keepsake* (of 1856) were the last of their race. Innumerable *Christmas Annals* are now published; but these are cheap collections of tales and poems, illustrated with odd cuts. They are accordingly quite unlike the old annals, and are similar to the extra Christmas number issued by many of the monthly magazines.

Annuity is the term employed to describe a payment generally (but not necessarily) of uniform amount falling due in each year during a given term, such as a period of years or the life of an individual; and payable, either in one sum at the

end of the year, or by half-yearly or other instalments. Annuities differ from other investments in this, that the capital sum invested or 'sunk' in the purchase of the annuity is not returnable when the annuity ceases to be payable—a portion of it is, in fact, returned in each payment of the annuity. By thus sacrificing the capital, a larger income is obtained, and hence the purchase of a life annuity is resorted to by persons whose main object is to secure a competency for themselves. For example, a male aged 60, by paying £1000 to the government, can secure an annuity of £87, 1s. 8d. for the remainder of his life, while the same sum invested in consols at par would yield £30 only. Annuities are divisible into two classes: (1) *Annuities certain*—that is, for a fixed term of years, subject to no contingency whatever, and depending for their value simply upon the operation of compound interest; and (2) *Annuities contingent*—that is, annuities depending not merely upon the operation of compound interest, but also upon the continuance of some status, such as the life of a person, whose duration can only be estimated by the theory of probabilities, on the average of a large number of cases. The former class is dealt with under the article INTEREST; the theory of annuities certain being, in fact, a branch of the theory of compound interest.

The LIFE ANNUITY (which is generally meant when the simple term 'annuity' is employed) is the principal example of the latter class, and to it our remarks must be mainly directed. In scientific treatises on the subject, an annuity is always assumed, unless otherwise described, to consist of an annual income of £1, or more simply of 1, payable at the end of each year survived: the amount for any larger sum being easily derived therefrom. When, in addition, a proportion of the year's annuity is payable up to the day of death, the annuity is said to be *complete*: the ordinary annuity being sometimes, for distinction, referred to as a *curtate* annuity. By the Appointment Acts, however, annuities are held as accruing from day to day, and therefore as apportionable or complete unless otherwise specified: the legal and the scientific practice being thus at variance in this respect. When the first payment is due in advance, the annuity is known as an *annuity due*; and on the other hand, when the first payment is not to be made until the expiry of a certain number of years, it is called a *deferred annuity*.

The honour of having been the first to place the calculation of life annuities on a scientific basis, by applying the doctrines of probabilities and of compound interest to a mortality table deduced from the recorded statistics of an actual community (Breslau), belongs to the celebrated astronomer royal, Halley. His monograph on the subject is printed in the *Philosophical Transactions* for January 1693. When Halley wrote, the Revolution government was endeavouring to complete the raising of a sum of a million sterling, by the issue of life annuities, offering 14 per cent. during the lifetime of any nominee, without restriction of age; thus appraising selected life-interests at only a trifle more than seven years' purchase. Notwithstanding the fact that Halley's table showed the life-interests of young nominees to be worth upwards of thirteen years' purchase, or nearly double the amount charged, money found its way but slowly into the national treasury. Adam Smith attributes this to the supposed instability of the government; but it may doubtless also be traced to ignorance or distrust of Halley's conclusions on the part of his countrymen. Certain it is, that at a much later period (1746), an issue of exchequer life annuities—again on ruinous terms, and without restriction of age—was left to be taken up mainly

by Dutchmen, who, being well informed on the subject of life contingencies through the writing of Kersboom, nominated children, and mostly young females; while the English subscribers selected their nominees from either sex, and of any age, up to 50 or 60 indifferently.

In 1808 the National Debt Commissioners commenced the granting of life annuities, graduated according to age, on the basis of the Northampton table of mortality (see MORTALITY, TABLES OF). Previous annuity transactions had resulted in heavy loss, and it might have occurred to those responsible for the new departure, that that loss was not likely to be retrieved by adopting a table which had been proved to yield a large profit when used as a basis for life-assurance premiums! Not until 1828, however, and after Mr Finlaison, the government actuary, had pointed out that the loss from the annuity business was advancing at the rate of £8000 per week, was the Northampton table abandoned. Shortly thereafter, new tables of annuities, deduced from the past experience of the government, and distinguishing between male and female lives, were issued. Since then, the rate of mortality prevailing among government annuitants has been twice re-investigated, so as to embrace the additional data accumulated. The existing rates for government annuities are deduced from tables issued in 1884. These tables embrace the further feature of giving effect to the superior vitality found to prevail among the lives at the date of the purchase of the annuities, as compared with that of the general body of annuitants of corresponding ages. The same tables are doubtless the most appropriate basis upon which life-assurance companies, and other institutions granting annuities, can construct their scale of charges. But while the government rates are based upon the assumption that only 2½ per cent. interest will be realised on the investments, assurance companies can afford to assume a future rate of 3½ or 3¾ per cent., while trusting, like the government, to the additional interest realised beyond the rate assumed proving sufficient to provide for the expenses of conducting the business. The following table gives examples of the rates of annuity, per £100 sunk, deduced from the new government annuity tables the annuities being calculated as 'complete,' and payable by half-yearly instalments:

	2½ per cent.			3½ per cent.			4½ per cent.			5½ per cent.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
40	5	11	10	6	7	2	5	0	6	5	15	5
45	6	1	3	6	16	5	5	9	1	6	3	9
50	6	13	4	7	8	4	6	0	7	6	15	1
55	7	10	0	8	4	9	6	15	8	7	10	1
60	8	14	2	9	9	0	7	16	10	8	11	2
65	10	6	11	11	1	10	9	6	5	10	0	10
70	12	10	11	13	6	0	11	9	8	12	4	6
75	15	11	8	16	7	2	14	6	1	15	1	1

The rates in the column headed 2½ per cent. are those actually allowed by the government; while those in the column headed 3½ per cent. may be taken as affording an approximation to the more favourable terms which may be obtained from various life-assurance offices in this country. A comparison of the two will show that at least past errors are not being perpetuated by the government.

The total sum paid by the government, in respect of annuities, during the year ending 31st March 1886, was £1,038,210, while the corresponding sum paid by the assurance offices during the year 1886, was about £625,000. These two sums, however,

represent only a very small proportion of the total annuity interest of the country; for, not to speak of the various widows' funds and annuity societies, it has to be borne in mind that a very large amount both of real and of personal property in this country is held in life-entail.

There is another important practical aspect in which the subject of life annuities may be viewed. While the government and corporate bodies granting annuities rely upon the principle of averages for the satisfactory working out of their transactions, a purchaser of an isolated annuity must proceed differently. He requires to protect himself against the loss of his capital, through the early death of the annuitant, and this can only be done by effecting an assurance on the life of the latter, without which, the transaction becomes a speculation and not an investment. Suppose a complete life annuity of £50 to be offered for sale, and an individual to be willing to purchase it at such a price as will yield him 5 per cent. on his outlay; then the first thing he would require to ascertain would be the rate of premium at which the life of the annuitant could be assured. This being found to be, say, 3 per cent. per annum, the intending purchaser would next proceed to calculate the sum, X , the interest upon which, together with the premium to assure its return at the death of the annuitant, would amount to £50. Thus:

$$(5 + 3) \times X \div 100 = 50 \therefore X = 625.$$

The premium to assure £625 is £18, 15s., and the interest on £625 at 5 per cent. is £31, 5s., together making up the annuity of £50. It should be borne in mind, however, that the £625 being the total outlay, the sum that can be paid to the seller is only £606, 5s., being the former sum, less £18, 15s., the amount of the first premium which requires to be paid in advance to the assurance office.

Of other forms of contingent annuities, a single example may be given. With many widows' funds it is a rule that the widow ceases to draw her annuity if she marries again. The calculation of an annuity ceasing either at death or upon re-marriage leads to no theoretical difficulties; but in order to obtain satisfactory results, it is necessary to have carefully compiled statistics of the ratio of re-marriage among widows of various ages.

In the law of England, an annuity is the right to the yearly payment of a certain sum of money, which is charged upon the person or personal estate of the individual bound to pay it. If it is charged upon real estate, the burden is called a rent or rent-charge, and not an annuity. An annuity may be created for a term of years, or for the life or lives of any persons named, or in perpetuity; and in the last case, if granted to a person and his heirs, the annuity is reckoned among incorporeal hereditaments; because, although the security is personal only, the annuity will descend in the same manner as real estate. In 1854 the old statutes relating to annuities were repealed, and enrolment in Chancery of annuity deeds is no longer necessary to give them validity. But registration is necessary in the case of annuities charged on land.

In Scots law, an annuity, as such, may be charged on real estate as well as on personality. In that system it has been simply defined to be a right to a yearly payment in money; and it may be created either by the payment of the sum of money in the form of a purchase, or it may be secured over land. In the latter case the creditor, in default of his annuity, may attach the land charged, claiming a capital sum out of the land sufficient to produce an annual interest equal to the annuity, until the expiration of the same. A like rule holds for the claim upon an annuity in bankruptcy. The instrument by which,

in Scotland, the annuity is constituted in either of the above forms is called a Bond of Annuity. The right to an annuity on the life of another descends to the heir of the creditor. The annuitant under a trust is entitled to have the trust kept up for security.

Annuity-tax, a local impost for the payment of the salaries of the Established clergy of the city of Edinburgh. It was first established on a limited scale by an act of the year 1661; and was extended in its sphere of operation by an act of the legislature as lately as 1809. It amounted at one time to 6 per cent. on the rents of houses and shops within the royalty. It was a peculiarity of this tax that the members of 'the College of Justice,' including the lawyer class generally, enjoyed an exemption from it, as a relic of an ancient privilege by which they were induced to reside and hold the courts of law in Edinburgh. The tax was reduced in 1860; and, under an act passed in 1870, it was redeemed by payment of £56,500 by the Corporation to the Edinburgh Ecclesiastical Commissioners.

Anulet (Lat. *annulus*, 'a ring'), a term in Architecture for a small fillet or band which frequently surrounds a column, &c. The annulet, a ring, is a charge in Heraldry. See CADENCY.

Annuloida, Annulosa. See WORMS.

Annunciation, the tidings brought by the angel Gabriel to the Virgin Mary of the incarnation of Christ. Also the festival kept by the church, in commemoration of this event, on the 25th of March. The festival was instituted about the beginning of the 7th century, those sermons of Athanasius and Gregory Thaumaturgus in which it is mentioned being now rejected as spurious; and the earliest certain references to it occurring in the acts of the Tenth Council of Toledo (656), and of the Trullan Council (692). In England, the festival is commonly called Lady Day (q.v.). Among the Jews, this title is given to a part of the ceremony of the Passover.

The *Order of the Annunciation*, now the highest Italian order, was instituted in 1360 by Amadeus VI., Duke of Savoy, and in 1725 was made the first order of the kingdom of Sardinia. The king is always grand-master. The knights who, since 1720, are not limited in number, must be of high rank, and already admitted to the orders of St Mauritius and St Lazarus.

Annus Deliberandi, in Scots law, was the period of a year allowed to an heir to deliberate whether he would accept the inheritance with the burden of his predecessor's debts. The year commenced on the death of the ancestor, unless in the case of a posthumous heir, when the year ran from the birth of the heir himself. By recent legislation, however, the period is shortened to six months, so that at the end of that time the creditors of the deceased may proceed to attach the estate, whatever the heir may resolve to do.

Anobium. See BORER and DEATH WATCH.

Anode (Gr. *ana*, 'up,' and *hodos*, 'a way'), a term in electrolysis (see GALVANISM) introduced by Faraday to designate the positive pole, or that surface by which the galvanic current enters the body undergoing decomposition (electrolyte); as opposed to *cathode*, the negative pole.

Anodyne (Gr. *an*, 'not,' and *odynē*, 'pain'), a medicine used to assuage pain. Anodyne may act either on the nerves and nerve-terminations (aconite, belladonna, cocaine, &c.); on the brain (chloral, Indian hemp); or on all these parts (opium, bromide of potassium). Those which act on the brain also tend to induce sleep.

Anointing. See CHRISM, CORONATION, EXTREME UNCTION.

Anomalistic Year is the interval that elapses between two successive passages of the earth through its perihelion, or point of nearest approach to the sun. If the earth's orbit had a fixed position in space, this period would correspond with that of a sidereal revolution, or the time the earth takes after leaving any point of the heavens to return to it again; but the disturbing influence of the other planets causes the perihelion to advance slowly (11".8 annually) in the direction of the earth's motion; so that the anomalistic year is longer (4 minutes 39 seconds) than the sidereal. The length of the anomalistic year is therefore 365 days, 6 hours, 13 minutes, 49 seconds.

Anomaly (Gr. *anomalia*, 'irregularity'), the angle measured at the sun between a planet in any point of its orbit and the last perihelion. It is so called because the first irregularities of planetary motion were discovered in the discrepancy between the actual and computed distance. The anomaly was formerly measured from the aphelion, the opposite point of the ellipse; but from the fact that the aphelia of most of the comets lie beyond the range of observation, the perihelion is now taken as the point of departure for all planetary bodies.

Anona. See CUSTARD-APPLE.

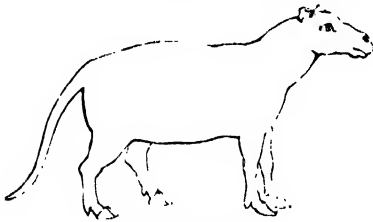
Anona'ceæ, the custard-apple order, are Thalamifloral Dicotyledons, closely allied to Magnoliaceæ. They are trees and shrubs, mostly tropical, and usually aromatic and fragrant. The fruit is sometimes dry, and in this case is usually aromatic and pungent—e.g. Calabash Nutmeg (*Momordica myristica*), and Ethiopian Pepper (*Xylocarpus aromaticus*). More frequently, however, the fruit is succulent, and is then often fragrant and delicious. See CUSTARD-APPLE.

Anonymous (Gr., 'nameless'), a term applied to a book the author of which does not give his name; when an assumed name is given, the term PSEUDONYMOS is used. Works of this class constitute one of the great difficulties of bibliography.

In Great Britain, till the foundation of the *Fortnightly* and *Contemporary Reviews* (1865-66), political articles were generally anonymous, as also was most of the literary criticism, till the starting of the *Academy* (1869). It is generally admitted that anonymity secures the independence of the critic, and enables him to write with greater freedom, vigour, and power; but it is true that he often abuses his advantage, and gratifies under the veil of the anonymous his own personal pique. The article on 'the fleshy school of poetry' in the *Contemporary Review* for October 1871, which drew upon its author such merited castigation from Dante G. Rossetti in his famous letter to the *Athenæum* on 'the steady school of criticism' (December 16, 1871), was an example of an attempt to preserve anonymity even in a magazine where the articles were signed. Its author, Robert Buchanan, having used the pseudonym of 'Robert Maitland.' Perhaps the most intolerable abuse of anonymity is the anonymous letter, which, even when the writer is known, is legally punishable only in so far as it is slanderous or comes under what Libel (q.v.). See Barbier's *Dictionnaire des Anonymes et Pseudonymes* (Paris, 1805; 2d ed. 1872-79), which embraces the titles of about 24,000 works, with the names of those who are assumed or known to be the authors. Other lists of anonymous and pseudonymous literature will be found in the indexes to *Notes and Queries*; in 'Olphar Hamst's' *Handbook of Fictitious Names* (1868); Cushing's *Initials and Pseudonyms* (New York, 1885), with his companion volume, *Anonymous* (1887), comprising the titles of 20,000 books and pamphlets, and authors' names; and Halkett and

Laing's *Dictionary of Anonymous and Pseudonymous Literature* (4 vols. Edin. 1881-1887).

Anoplotherium (from the Greek *an*, 'not,' *hoplon*, 'armour,' and *therion*, 'a beast'), a genus of extinct even-toed hoofed animals, Artiodactyla (q.v.), established by Cuvier from bones occurring in great abundance in the gypseous strata of the Oligocene formation near Paris. They are found also in the same formation in the Isle of Wight and elsewhere. The teeth differ from those of all other Ungulates, extinct or recent. There are six incisors, two canines, eight premolars, and six molars in each jaw—the dental formula thus agreeing with that of the fossil genus Palæotherium (q.v.); but the teeth are arranged in a continuous series without intervening vacancies—a circumstance very remarkable, as it does not occur in any existing quadruped, but now appears in man alone. The molars of the upper jaw have quadrate crowns; those of the lower are marked with a double or triple crescent of enamel, which forms prominent ridges. In some respects, the teeth resemble those of the rhinoceros, and exhibit generalised selenodont characters—that is to say, the teeth are crescentic, like those of the Ruminantia (q.v.), or ruminating quadrupeds, between which and the non-ruminant Artiodactyla the Anoplotherium has been thought to form a connecting



Anoplotherium.

link; but in some of the species originally included in this genus, and which are now sometimes ranked along with it under the name *Anoplotheroids*, the teeth exhibit peculiarities which have led to the supposition that their food may not have been exclusively vegetable. The snout is not much elongated, and it is evident that there was no proboscis. The feet are terminated by two toes, as in the Ruminantia; but they have always separate metacarpal and metatarsal bones, not a single cannon bone. Several species of Anoplotherium have been determined the size of the animal being about that of the ass. Closely allied to Anoplotherium are certain other genera, of which *Dichodon* and *Dichobune* are the most important. These, with Anoplotherium, form the family of the Anoplotheriidae.

Anquetil, LOUIS PIERRE, a French historian, born at Paris in 1723, took orders, and, after filling educational posts at Rheims and Sens, got a government appointment under Napoleon. He died, a member of the Institute, at Paris, September 6, 1806. He wrote a history of Rheims, and numerous memoirs on periods of French history; but his great work is his *Histoire de France* (14 vols. 1805), continued by Bouillet to 1862 in 6 additional volumes.

Anquetil-Duperron, ABRAHAM HYACINTHE, brother of the preceding, a French orientalist, was born at Paris, December 7, 1731. He first studied theology, but finally devoted himself to oriental languages, and such was his passion for this study that he enlisted as a private soldier for India at twenty-three in order to gratify it. The government having been made aware of this proof of the scholar's ardour, made him an allowance so as

to enable him to proceed independently. After an extensive journey in India, he fixed his residence at Surat, where he gained an intimacy with the Parsee priests, and obtained from them manuscripts of the Zend-avesta and the later Persian religious books. After the fall of Pondicherry (1761), he returned to Europe, carrying with him nearly two hundred manuscripts, and soon obtained through the influence of the Abbé Barthélemy a situation in the Bibliothèque Royale. His *Zend-avesta, ouvrage de Zoroaster*, appeared in 1771, and being the first translation ever made into a European tongue, attracted much attention. This translation has long been superseded, as it was made, not from the original, but from the more or less inaccurate Persian translation of his Indian teacher. Another important work is his *Oupnekhat* (1801-2), a Latin translation of two manuscripts which contained an old Persian version of the chief Indian *Upanishads*. It was from this translation that Schopenhauer drew that intimate acquaintance with Indian philosophy which influenced his own system so profoundly. Anquetil-Duperron died at Paris 17th January 1805.

Ansars, more correctly *Nossairians*, an Arab sect living in the mountainous region of Syria north of the Lebanon Mountains. Their whole number is about 75,000. Their religious forms show their origin in Mohammedan gnosticism, with an admixture of the elements of old Syrian nature-worship. They appear first in the 10th century, but the history of their origin is obscure. They believe in a Mahdi or Messiah to come, the twelfth and last of the imams or emanations of the divine spirit, and they keep secret their religious rites and grades of initiation. Like the Shiites, they reverence Ali, the nephew of Mohammed; and they practise impure mysteries which have made them the by-word of the neighbouring races. Their prophet is Nossair, the first to proclaim the apotheosis of Ali, and from him they derive their name. They have special religious books, and a kind of holy communion with the cup; in their prayers they turn towards the rising and the setting sun; they believe also in a kind of Trinity; and in a constant transmigration of souls, which for the faithful is a process of purification until they reach at length the higher and more perfect states of earthly life, and find places as brilliant stars on the horizon. Those, however, who have denied or made known the sacred mysteries, or who have denied the divinity of Ali, are doomed to death, or are transmigrated into Jews, Christians, or Mohammedans, or into dogs, swine, and asses. The Ansars have often defended their freedom with bravery against the Turks. The name Ansars was also applied to the first adherents of Mohammed.

Ansbach (in England often ANSPACH), a town of Bavaria, on the Rezat, 25 miles SW. of Nürnberg. It has manufactures of furniture, buttons, bricks, woollen-yarn, lace, gold embroidery, beer, chicory, tobacco, and cigars; as well as straw-plaiting and iron-founding, and a brisk horse and cattle market. The situation is pleasant, but there are no remarkable buildings, except the deserted palace of the former margraves of Ansbach, surrounded by gardens, and the church of St Gumpert, said to occupy the site of a church erected in the 8th century. The margraves of the old principality of Ansbach were a branch of the family of Hohen-zollern. The last of them gave up his possessions in 1791 to Prussia; and in 1807 Napoleon transferred Ansbach to Bavaria. Pop. (1885) 14,057.

Ansell, RICHARD, animal and landscape painter, was born at Liverpool in 1815. Abandoning business for art, he exhibited at the Royal Academy in 1840, and at the British Institute in 1846. A visit to Spain with John Phillip in 1856

led to a series of Spanish subjects. He thrice won the Heywood Medal at Manchester, and a gold medal at the Paris Exhibition of 1855. He was elected A.R.A. in 1861, and R.A. in 1870. He died 20th April 1885.

Anselm of CANTERBURY, a scholastic philosopher, was born at or near Aosta, in Piedmont, in 1033. At the age of fifteen, Anselm ardently desired to enter the monastic life, but his father sternly refused his consent. After his mother's death, he resolved to escape from his father's oppression, and to seek a career across the Alps. Here he spent three years in Burgundy, and being attracted by the reputation of Lanfranc, he went in 1060 to study at the monastery of Bee, in Normandy. Three years after, he succeeded his master as prior, and in 1078 became abbot of this monastery, the most famous school of the 11th century. Lanfranc, who in the meantime had gone to England, and become Archbishop of Canterbury, died in 1089; and the diocese remained four years without a successor, till in 1093 Anselm was appointed. He was distinguished both as a churchman and a philosopher. His numerous embroilments with William Rufus and his successor, and the unbending spirit which he displayed in these, even when subjected to banishment, indicate the vigour and resoluteness of his character, as much as his writings exhibit the depth and acuteness of his intellect. Exiled by Rufus, Anselm returned at Henry's urgent request; but the new monarch's demand that he should renew his homage, and be again invested with his archbishopric, was met with an absolute refusal, and led to a second exile of two years' duration. In 1105, however, Anselm's threat of excommunication led to the reconciliation of king and prelate, and the compromise was devised which, in 1122, was accepted by pope and emperor at Worms (see INVESTITURE). Anselm was a second Augustine, superior to all his contemporaries in sagacity and dialectical skill, and equal to the most eminent in virtue and piety. Embracing, without question, the doctrines of the church, mostly as stated by Augustine, and holding that belief must precede knowledge, and must be implicit and undoubting, he yet felt the necessity of a religious philosophy, urged the duty of proceeding from belief to knowledge, and sought to reduce the truths of religion into the form of a connected series of reasonings. It was for this purpose he wrote his *Monologion*. In his *Proslogion*, he strove to demonstrate the existence of God from the conception of a perfect being, as Descartes also subsequently did. His *Cur Deus Homo* (Eng. trans. by Prout, 1887) argues the necessity of the Incarnation, all subsequent speculation on which it has profoundly influenced (see ATONEMENT). Besides his philosophical treatises, his *Meditations* and *Letters* have come down to us, revealing his humble fervent faith, and the tender sympathy of his nature. Anselm may in a sense be reckoned the earliest of the schoolmen, to whom, although they employed a different method, his works first supplied the impulse to justify Scripture and the church by reason. He died April 21, 1109, and was buried next to Lanfranc at Canterbury. In 1494 he was canonised, but Dante had long before placed him among the greatest saint in paradise. In 1720 Clement XI. expressed his name in the list of church authorities. See Remusat's *Anselme* (1853; 2d ed. 1868); Dean Church's *Anselm* (1870); *Life and Times of St Anselm* (2 vols. 1883), by Mr Martin Rule, who has also edited for the Rolls Series Eadmer's two lives of Anselm (1884).

Anser. See ANAS, and GOOSE.

Ansgar (*Anscharius*), the Apostle of the North, was born in Hedeby in 801. Under the patronage

of Louis le Débonnaire, he went, with his colleague Authbert, to preach Christianity to the heathen Northmen of Sleswick. He suffered many persecutions; but had nevertheless such success that, in 831, the pope established an archbishopric in Hamburg (transferred to Bremen in 847), and Ansgar was appointed the first archbishop. He made several missionary tours in Denmark and Sweden, and died in 865 at Bremen. See his *Life* by Tappéhorn (Münst. 1863).

Anson, GEORGE, LORD ANSON, born 23d April 1697, at Shugborough Park, Staffordshire, entered the navy in 1712, and was made a captain in 1724. In 1739, on the outbreak of war with Spain, he received the command of a Pacific squadron of six vessels, with instructions to inflict whatever injury he could on the Spanish commerce and colonies, and he sailed from England in September 1740. Vessels, crews, and stores were alike indifferent; yet, in spite of all disadvantages, he achieved a brilliant reputation by the heroism, prudence, diligence, and humanity he displayed. With only one ship, and less than two hundred of his original followers, but with £500,000 of Spanish treasure, he returned to Spithead, June 15, 1744, having circumnavigated the globe in three years and nine months. His perilous cruise greatly extended the knowledge of navigation and geography. As a reward for his services, Anson was made Rear-admiral of the Blue (1744); and in 1747, having utterly defeated the French admiral Jonquière, off Cape Finisterre, and captured £300,000, he was made Baron Anson of Soberton, and, four years later, First Lord of the Admiralty. In 1761 he received the high dignity of Admiral of the Fleet. He died at his country seat, Moor Park, Hertfordshire, 6th June 1762. Few works have been so popular as Anson's *Voyage round the World* (1748), of which, whether edited by Walter or Robins, he himself was virtually the author. See his *Life* by Sir John Barrow (1839).

Ansonia, a borough within the town of Derby, New Haven county, Connecticut, lies on both sides of the Naugatuck River, 2 miles above its confluence with the Housatonic, and 12 miles W. of New Haven by rail. It has manufactures of iron, brass, and copper goods, clocks, electrical goods, webbing and knit goods, carriages, and hardware. Pop. 8500.

Anspach. See ANSBACH.

Ansted, DAVID THOMAS, geologist, born in London, February 5, 1814. After gaining a fellowship at Jesus College, Cambridge, he devoted himself to geology under Sedgwick, in 1840 was appointed to the chair of Geology in King's College, London, and was elected F.R.S. In 1845 he became attached to the Indian military school at Addiscombe, and the college for civil engineers at Putney. From this time until his death, through a carriage accident near Woodbridge, in Suffolk, May 13, 1880, he devoted his studies to the economic applications of geology, and was much consulted in great mining and engineering operations. His works on his chosen subject were numerous and popular.

Anstey, CHRISTOPHER, born in 1724, was educated at Bury St Edmunds, Eton, and King's College, Cambridge, of which he was a fellow from 1745 to 1754. In 1766 he published the *New Bath Guide*, whose fun and humour—somewhat faded now—achieved a success approached by none of his subsequent poems. He died in 1805.

Anstruther, EASTER and WESTER, two contiguous royal burghs on the coast of Fife, 9 miles south of St Andrews. Fishing and fish-curing are the staple industries, the harbour (1866-77) being at Cellardyke. East Anstruther was the birth-

place of Dr Chalmers, Tennant the poet, and Goodsir the anatomist. With the other St Andrews burghs, they return a member to parliament. Joint pop. 1843.

Ant. *Ants* (*Formicidæ*, *Myrmicidæ*) are a group of Hymenopterous insects, in the same order as wasps and bees, which they resemble, not only in general structure, but in the high evolution of their instinctive habits and social life. The word 'ant' is contracted from the old-fashioned Saxon word *ænnet*; and 'pismire' is another almost obsolete, originally Danish term. The white ants or Termites (q.v.) are members of an entirely different order—Neuroptera. The ant family is represented by between two and three thousand different forms, widely distributed in temperate and tropical countries. Three sub-families are usually distinguished the Formicidæ proper, the Poneridæ, and the Myrmicidæ. Numerous fossil forms are known, often beautifully preserved within pieces of amber. In the tertiary formations, eighty-three distinct species have been chronicled.

The study of ants has engaged the attention of naturalists from before the days of Aristotle and Pliny, but it is only since the beginning of this century that the careful researches of Latreille, Hüber, Forel, Smith, Mayr, Lubbock, and many others, have established an exact knowledge alike of their forms and habits.

Different Forms.—Like most bees, ants occur in three different forms—(a) the perfect *frondes* or queens, the mothers of new generations; (b) the short-lived *mules*, which die soon after the 'nuptial flight'; and (c) the great majority of *workers*, which are predominantly females, though rarely sexual, and often exhibit different forms according to the work which they have to do. In some cases, further, there are distinct classes of workers.

Structure.—As in other insects, the body consists of three parts—head, thorax, and abdomen. The head, which of course contains the 'brain,' is, though minute, yet large in proportion.

Life history.—As in many other insects, there are four chapters in the life-history of an ant—viz. egg, larva, chrysalis, and perfect insect. The

after a period varying from a few weeks to as many months, become pupæ or chrysalids. These may remain naked, or may spin silken robes or cocoons. The nursing care of the workers does not cease; the brood is kept clean, shifted into the sunshine, or carried off in case of danger. Ant pupæ are collected and sold both in this country and on the Continent as food for young birds. After a short while, during which no food is taken, the perfect insects appear, weak and helpless, still dependent upon the kindly aid of the workers, even to free them from their silken birth-robes. For some weeks, in fact, the workers continue to care for them. As in all insects with a similar history, or complete metamorphosis, the insect has attained its full size when it leaves the pupa stage. Left to themselves, the males generally die after fertilising the queens in the nuptial flight, but the queens and workers may live for several years. Great numbers fall victims to other animals—insects, spiders, birds, ant-eating mammals, &c.; and, small as they are, ants are not unfrequently attacked by still smaller parasites.

Food.—The whole food-supply for the inmates of the nest is collected by the industrious workers, or in a few cases by captured slaves of another species. The food chiefly consists either of insects and available animal matter, or of sweet vegetable substances, such as honey, fruit, and sugar. In the Honey Ant, described by McCook (see fig. 4), the abdomen is enormously distended with honey, which is forcibly injected by the normal workers, and is afterwards utilised for the young brood. When the honey exudes by accident, it is greedily lapped up by the workers, but if the honey-pot die, both corpse and honey are buried. The squeezed-out honey is said to be sold in Mexican markets as the basis of a drink resembling mead. The harvesting or grain-storing habit, often alluded to in ancient literature, and remaining unquestioned in popular belief, was for a long time regarded with considerable scepticism by scientific investigators. It was questioned in 1747 by the Rev. W. Gould, one of the early students of ants in Britain, and such authorities as Latreille and Huber believed his hesitation to be thoroughly justified. The barleycorn-like pupæ cocoons suggested the possibility of mistaken observation, while the torpor of ants during the winter of northern countries did not consist with any storing habit. Yet the opinion of the ancients was expressed in unmistakably circumstantial language, as in this regulation as to ant-granaries found in the Mishna: 'The little caves of ants, when in the midst of a standing crop, are adjudget to the owner of the field; of those behind the reapers, the upper part is the property of the poor, the lower of the proprietor.' The opinion of the ancients has been amply confirmed. Thus in 1829 Lieutenant-colonel Sykes noted at Poonah the large heaps of millet-seed stored up by a species of ant which he named *Atta procidentis*. The same was demonstrated by Mr Moggridge in regard to some ants in the south of Europe, while Dr McCook has given a most graphic account of the harvesting habits exhibited by the agricultural ants of Texas. Moggridge also noted that the seeds are somehow prevented from germinating, but if the process should in exceptional cases begin, the ants are clever enough to cut off the radicle.

Ants are especially fond of the sweet secretion which flows out from the plant-lice or Aphides (q.v.); and some species not only tap and tickle the latter to induce them to part with their honey-dew, but keep them, as Linnaeus said, as 'cows,' protecting them in sheds, and yet more marvellously caring for their eggs. Several breeds

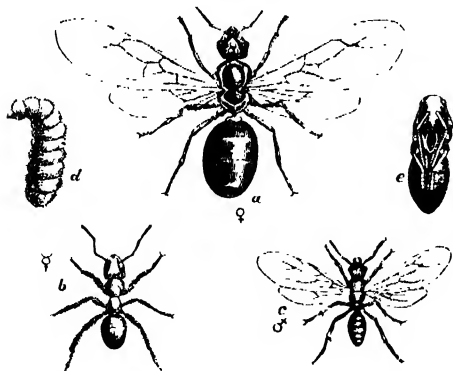


Fig. 1.—A Common Ant (*Lasius flavus*):
a, queen; b, worker; c, male; d, larva; e, pupa.
(After Lubbock.)

minute white or yellowish eggs laid by the queen in the ant nest, are hatched in from two to six weeks, and develop into white legless larvae or grubs. Both eggs and grubs are carefully watched, and the grubs fed, by the ever-vigilant workers. Thanks to the abundant food-supply, which is given them in a prepared form, the larvae increase greatly both in size and in complexity, and

of aphid 'cows' are thus appropriated and utilised, and apparently regarded by these pastoral ants as distinctly their 'property,' for the possession of which, if need be, they will even fight. Other insects are sometimes similarly utilised. Several naturalists, such as Bates and Belt, have given vivid accounts of the ravages of the Drivers and Hunting Ants. 'The dread of them is upon every living thing. Their entrance into a house is soon known by the simultaneous and universal movement of rats, mice, lizards, cockroaches, and vermin of all sorts. When they are fairly in, we give up the house, and try to await with patience their pleasure, thankful indeed if permitted to remain within the narrow limits of our beds and chairs.' 'Wherever the marauding Ecitons move,' Bates says, 'the whole animal world is set in commotion, and every creature tries to get out of the way. The main column of the army, from four to six deep, moves forward in a given direction, clearing the ground of all animal matter dead or alive, and throwing off, here and there, a thinner column to forage on the flanks.' The blind driver ants of Africa (*Anomma*) are perfect nomads, overcoming every obstacle in their blind march, and even forming 'animated suspension-bridges' over broad streams. Though useful as scavengers, their unchecked multiplication may result in ravages very much the reverse of beneficial. More than a hundred years ago, vast hordes of *Formica saccharivora* appeared in the island of Grenada, and did the greatest damage to the sugar plantations. 'They descended from the hills like torrents, and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, and reptiles of every kind became an easy prey to them; and even birds, which they attacked whenever they lighted on the ground in search of food, were so harassed, as to be at length unable to resist them. Streams of water opposed only a temporary obstacle to their progress: the foremost rushing blindly on certain death, and fresh armies instantly following, till a bank was formed of the carcasses of those which were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety. Even fire was tried without effect. When it was lighted to arrest their route, they rushed into the blaze in such myriads as to extinguish it.' A reward of £20,000 was offered in vain for an effectual means of destroying them; but in 1780 a hurricane which tore up the canes, and exposed their habitations to a deluge of rain, freed the island from this plague. In reference to their food-acquiring habits, ants may be classified as hunting, pastoral, and agricultural:—three types,' as Lubbock remarks, 'offering a curious analogy to the three great phases in the history of human development.'

Nests.—Most ants live in chambered nests. These are of very varied construction, from simple heaps of loose material to houses of more or less elaborate architecture. Some simply utilise the shelter of a large stone, under which they burrow, while others weave a hanging silken nest; some bore into old stumps, which they riddle with their tunnels, and others form a home from leaves glued or woven together. The common yellow ant, *F. flava*, makes an underground nest, which looks like a little grassy mound, perforated by numerous passages, and sometimes a foot in height. The nest of *F. rufa* is often twice as large, and exhibits a thatched dome, with lattice-work shutters and doors which are closed at night. In South America, the ant-hills are sometime several feet in height, and exhibit internally a marvellously complex and orderly arrangement of chambers and galleries. The so-called 'mason-ants' use soft

clay in forming the roofs and partition of their neat chambers, while the 'carpenters' hollow out their houses in trees and shrubs. *F. flava* forms its partition-walls of a sort of papier-mâché of



Fig. 2.—Part of a Gallery, with Ant working on tiptoe: *Pogonomyrmex mollicornis*, the Agricultural Ant of Texas. (From McCook.)

sawdust, earth, and spider's web. *F. smaragdina*, an East Indian species, forms its nest of a thin silk-like tissue. *F. bispinosa*, in Cayenne, makes a felt of the down which envelops the seeds of the *Bombax eriba*; while an East Indian species, *Myrmica kirbyi*, forms a globular nest of a congeries of tile-like plates of cow-dung. *M. nidificans*, in Malabar and Malacca, forms a nest of some papery material which it fixes on a leaf; and the 'umbrella' ant of Brazil was said by Bates to thatch its large mansion (sometimes 40 yards in circumference and two feet in height) with circles of leaf 'cut with accurate precision from coffee and orange trees, which they oftentimes strip bare to carry out their bold architectural designs.' Belt has, however, noted that, in Nicaragua at least, the leaves are stored until they decay and become covered with a fungus which forms the food of the ant. Roads, tunnels, and covered ways are



Fig. 3. Ant's Nest (a mound disc) with Roads: *Pogonomyrmex mollicornis*, the Agricultural Ant of Texas. (From McCook.)

also frequently formed round about the nests for safe and convenient transit. Many communities, sometimes including alien lodgers, may live within the bounds of a large nest, and a single community may contain more than half a million members.

Scars. As has been already noted, an ant's nest contains three kinds of individuals: the crowd of workers, the short-lived males, and one or more queen-mothers. The workers are really imperfect females, and besides the queens, some species include a third form of female. Though the queens are the real mothers, Lubbock has proved that in most nests there are a few fertile workers, but their eggs, if they develop at all, seem always to produce males. It is generally supposed that the ants are able, like bees, to determine, by differences of food, &c., whether a given egg will develop into a worker or a queen. In the course of summer, when external conditions are favourable, the winged males and young queens leave the nest in a marriage-flight, during which fertilisation is effected. The columns of myriad insects, rising like smoke, and glittering in the sun, attracted attention long before they were understood.

'Each column looks like a kind of slender network, and has a tremulous undulating motion. The noise emitted by myriads and myriads of these creatures does not exceed the hum of a single wasp. The slightest zephyr disperses them.' During this flight many fall victims to the elements and living enemies. It is still doubtful how the new nests are generally founded, but Lubbock has shown that an isolated queen-ant is capable of giving origin to a new community, while it appears that in other cases an old-established nest may adopt a fresh queen, secured by the workers when she falls near the nest from her marriage-flight. Several queens may reign together in one nest, and they are always treated with a loyal devotion, associated, however, with a judicious measure of control. The Rev. W. Farren White quotes the following interesting passage from Gould, who has been already referred to as one of the early students of British ants: 'In whatever apartment a queen condescends to be present, she commands obedience and respect, and a universal gladness spreads itself through the whole cell, which is expressed by particular acts of joy and exultation. They have a peculiar way of skipping, leaping, and standing up on their hind-legs and prancing with the others. These frolics they make use of both to congratulate each other when they meet, and to show their regard for the queen.' As among bees, there are a few genera of solitary ants. In these Mutillidae, the males are winged, the females wingless, and there are no workers. Four forms have been found in Britain, one of which, *Mutilla europaea*, inhabits the nests of humble-bees, on which it appears to be parasitic.

Division of Labour, and Polymorphism.—There is a general division of labour involved in the existence of a caste of workers separate from the males and normal females. But apart from this the workers come to discharge among themselves very different functions. The young and the old, the small and the large, are set apart for different duties. Such division of labour tends, however, to produce difference of form (or polymorphism), just as variety of occupation tends to do among men. Thus it is not surprising to find in some species several types or castes of workers. In the Saïba or umbrella ant of South America, besides males and queens, there are (a) small ordinary workers, (b) large workers with very large hairy heads, and (c) large workers with large polished heads. Bates suggests that the last two kinds are of use in war as passive butts, 'as *pièces de résistance*, serving as foils against onslaughts made on the main body of workers.' In other cases, certain members of the community serve as 'animated honey pots,' with the somewhat tantalising function

gravely recorded. The observations of the ancients have been verified by Hübler with his characteristic carefulness, and Thoreau gives a graphic account of some of the encounters he witnessed during his life at Walden. In some ant communities, members of other species are captured when young, and used as slaves. As these not only work and forage for their masters, but even feed them, the latter degenerate, and *Polyergus rufescens* is wholly dependent even for its life on its slaves. Lubbock notes how every transition is exhibited between bold marauders and enervated masters—hopeless parasites upon their slaves. Besides the association with aphides already noted, ants tolerate various insect inmates within their nests.

Relation to Plants.—While flying insects, like bees, which carry the fertilising pollen from one plant to another, have played an important part in the evolution of flowers, ants have had an influence of another kind. Visits of ants would in most cases simply mean a loss of honey without any advantage to the plant; it is therefore natural that many plants should exhibit contrivances for warding off the attacks of ants. Moats formed by leaf-cups, curved slippery surfaces, narrow or closed passages, viscid secretions, bristling hairs, &c. are all effective protections against ants. In the tropics, some species of ants do much damage by stripping off the leaves of plants, but in other cases ants may be of actual service in driving off more destructive species or other insects. The large 'bull's-horn thorns' of certain Central American species of acacia are tenanted by a species of ants (*Pseudomyrma bicolor*), forming 'a most efficient standing army for the plant, which not only prevents the mammalia from browsing on the leaves, but delivers it from the attacks of a more dangerous enemy—the leaf-cutting ants.' Moseley notes that in the case of two plants growing as Epiphytes (q.v.) on trees, a gall-like tumour is always formed at their base by ants, without which the plants cannot thrive.

Intelligence. The senses of ants are well developed. They are keenly sensitive to slight changes of temperature and light, and can both perceive rays and hear sounds for which our sense-organs are not adapted. Some forms are able to make a rasping noise by means of a structure on the abdomen, and the solitary ant, *Mutilla*, utters when seized a characteristic note between a buzz and a squeak. The highly developed sense of smell appears to aid them greatly in finding their way, in which, however, they are not, at the best, adepts. They are able to recognise the members of their own community even when these are intoxicated, or removed from the nest as larvae and brought up separately. Several naturalists have shown that ants are able definitely to communicate with one another 'by something approaching to language.' The habits of ants have long formed a favourite study of naturalists, and the intimacy with which they have been studied is, doubtless to some extent, the reason of their being so often referred to. Their ceaseless industry when there is work to do has become proverbial, while many authorities have also noted an indulgence in 'sportive exercises' or 'play.' A recent observer, the Rev. W. Farren White, describes the exuberance of delight exhibited by the inmates of a formicarium when placed near the fire. 'They embraced each other, and skipped and danced like playful lambs or kittens.' Careful removal of the dead has also been observed. Their ingenuity in economising labour, e.g. in dropping desired objects from a height to others waiting below—in overcoming obstacles, e.g. by themselves forming living bridges or building more substantial inanimate ones—in the architectural devices exhibited by their manifold



Fig. 4.—Honey Ant (*Myrmecocryptus mexicanus*):
a, natural size.
(From Rev. W. Farren White.)

of 'receiving, retaining, and redistributing the honey.' Sanginary wars between different species of ants have been observed from very early times, and the dates of certain remarkable campaigns

ness, and in many other ways—has become a common subject of deserved admiration, though their marvellous powers are associated with no less striking limitations. In their recognition after separation for months, in their care for the young or disabled, as well as in their persistent enmity to competing species and communities, ants exhibit a considerable range of emotional development.

'When we see an ant-hill, tenanted by thousands of industrious inhabitants, excavating chambers, forming tunnels, making roads, guarding their home, gathering food, feeding the young, tending their domestic animals, each one fulfilling its duties industriously and without confusion, it is difficult altogether to deny them the gift of reason,' or escape the conviction 'that their mental powers differ from those of men, not so much in kind as in degree' (Lubbock).

See *Instinct, Insect, Aphides*; Lubbock's *Ants, Bees, and Wasps* (Internat. Sc. Series, 1882), to which valuable work, as well as to personal revision by its author, this article is very largely indebted; Rev. W. Farren White's *Ants and Their Ways*, with a useful list of British ants; M'Cook's *Agricultural Ant of Texas* (1880); Bates's *Naturalist on the Amazon*; Belt's *Naturalist in Nicaragua*; and the abundant literature referred to in the works of the first two.

Antacids are drugs used for the purpose of neutralising or diminishing excessive acidity of the digestive system, or of the different excretions. Substances which act upon the former are termed direct, and upon the latter, remote antacids. Many drugs act in both ways, such as potash, soda, lithia, lime, and magnesia, as well as their combinations with carbonic acid. Some substances—as for instance, ammonia and its carbonate—are only direct antacids, being converted into acids in the body, and thus increasing the acidity of the urine. Others like the acetates, tartrates, and citrates of the alkalis—are not direct antacids, inasmuch as they are neutral salts, but, being converted into carbonates in their passage through the body, they act as remote antacids, and reduce the acidity of the urine. The direct antacids are required when digestion is followed by the generation of too much acid. When this is confined to the stomach, potash is to be preferred, as being more readily absorbed, or in the case of aged or feeble individuals, ammonia, as being at once a stimulant and an antacid. If the acidity exists in the bowels, soda, lime, or magnesia is to be given, as being less readily absorbed than potash, and more likely therefore to reach the situation of the acidity. The remote antacids are required in all cases where the blood contains uric acid, and the urine is excessively acid. In such cases, potash or lithia must be chosen, as forming much more soluble urates than soda.

Antæus, in Greek Mythology, a son of Poseidon and Gê, a huge giant in Libya, who challenged all strangers who came to his country to wrestle with him. No one could throw him, because every time he touched the earth, his mother, he received new strength. Those whom he threw were skinned, and out of their skulls he built a temple to his father, Poseidon. At last, Hercules crushed him, lifting him up so that he could not touch the earth. The overthrow of Antæus was a favourite subject, both in ancient poetry and art.

Antalcidas, a Spartan politician, chiefly known by the celebrated treaty concluded with Persia at the close of the Corinthian war in 387 B.C., and called by his name, as it was the fruit of his skilful diplomacy. By this treaty, all the towns on the mainland of Asia passed under the Persian sway; the Athenians retained only Lemnos, Imbros, and Scyros, while all the other Greek cities were declared independent. In con-

sequence of it, Spartan influence became supreme in Greece, while everything gained by Athens in the Persian wars was lost.

Antananarivo, or TANANARIVO, the capital city of Madagascar, and seat of the government, has a population estimated at 80,000. It is situated on a hill, in an undulating district, at an elevation of 5000 feet above the level of the sea. It is exposed to fearful thunder-storms. The approach to it from Tamatave, the chief seaport, is extremely tedious and difficult, owing to the want of roads. It is, in spite of this, the seat of considerable trade and industry. The royal palace occupies the summit of the hill; adjoining are the dwellings of the chief officers of government; and below these, covering the slope of the hill, and built on terraces, are the houses of the other inhabitants, constructed of mud and sun-dried bricks. The people exhibit a considerable aptitude for civilised usages; and, thanks to missionary enterprise, considerable progress has been made towards the adoption of European habits.

Anta'ra, or ANTAR, a celebrated Arab chief in the middle of the 6th century, one of the seven poets whose prize-poems were hung up on the Caaba, and thence called *Muallakat* ('suspended'). In the poem of his that has descended to our day, he describes his warlike deeds and his love for Abla. His courage and heroism appear to have formed the groundwork of the voluminous romance known by his name, dating from the 8th century.

Antarctic Ocean. The Antarctic Ocean is situated about, or within, the Antarctic Circle. The Great Southern Ocean, according to modern geographers, is that part of the ocean which surrounds the world in one continuous band between the latitude of 40° S. and the Antarctic Circle. This band is only partially interrupted by the southern prolongation of South America. The northern portions of this band are often called the South Atlantic, South Indian, and South Pacific, while the southern portions are usually called the Antarctic Ocean. The average depth of the continuous ocean which surrounds south polar land is about two miles; it gradually shoals towards Antarctic land, which in some places is met with a short distance within the Antarctic Circle. The *Challenger* found 1800 fathoms near the Antarctic Circle south of Kerguelen, but Ross records a much greater depth in the same latitude south of the Sandwich group. Only three navigators, Cook, Weddell, and Ross, have crossed the 70th parallel south. Of several other expeditions that have crossed the Antarctic Circle, the most notable was the *Challenger* in 1874, the only steam-vessel that had visited these seas. The majority of Antarctic voyagers have discovered land south of the 60th parallel, Cook in 71° S. and 107° W. Bellingshausen discovered Peter Island and Alexander Land, D'Urville discovered Adelie Land. Wilkes found land extending from the 100th to the 160th meridian of E. long. between the parallels of 65° and 67° S. Ross discovered Victoria Land, and in February 1841 sailed along its coasts within sight of the high mountain ranges, 7000 to 10,000 feet above the sea, as far as 78° S. The mountain range here terminated in an active volcano, Mount Erebus, 12,000 feet in height. His farther progress was stopped by an icy barrier 150 to 200 feet in height, along which he sailed to the east for 300 miles. The depth off this ice-barrier was 260 fathoms, so that it was just in the condition to generate those large, flat-topped, tabular icebergs, which are the characteristic feature of the Antarctic regions. Where the coast is steep and high, there is no true 'ice-barrier,' the ice being only

6 or 10 feet above the sea, extending many miles from the shore. Ross and D'Urville alone have succeeded in setting foot on land within the Antarctic Circle. This land was of volcanic origin; but there is no doubt a large extent of continental land around the South Pole, for the *Challenger* dredged up granites, mica-schists, sandstones, and other continental rocks close to the ice-barrier. Mr Murray estimates the extent of the Antarctic continent at 3,000,000 square miles. Vegetation and land animals have not been observed on this land. Whales, grampuses, seals, penguins, petrels, albatrosses, and other oceanic birds abound. Diatoms are very abundant in the surface-waters, and their dead frustules form a pure white deposit called *diatom ooze*, about the latitude of 60°, outside the blue mounds which surround the continent. Life is abundant in the surface-waters, and at the bottom of the ocean. The mean temperature both of the air and sea, south of 63° S., is even in summer below the freezing-point of seawater. Between 60° and 63° S., a sensible rise takes place, temperatures as high as 38° F. being recorded both of sea and air in March. The *Challenger* found a cold layer of water sandwiched between a warm one on the surface and a warm one at the bottom; the surface layer was 37°-2; the cold layer at eighty fathoms was 32°-5; the temperature of the warm bottom layer was not accurately determined, but it was probably about 33° F. It is remarkable that the bottom temperature at 50° S. (33°-5 F.) is little different from the bottom water all over the Indian and other oceans. The return currents of dense, warm, tropical water from the Indian, Atlantic, and Pacific Oceans, which run southward along the eastern shores of America, Africa, and Australia, sink on reaching a latitude of from 45 to 56° S., and flow north at the bottom to supply the loss in the tropics by surface-currents and evaporation, and south, to supply the place of the ice-cold water drifted northwards. The barometric pressure within the Antarctic Regions appears to be low, considerably under 29.000 inches. The winds blow cyclonically in towards the Pole from the Southern Ocean, carrying with them much moisture. The fall of rain and snow is estimated as about equal to a rainfall of 30 inches annually. The ice on the Antarctic continent is stated by some writers to have a thickness of several miles, but there is no reliable information on this point. As our knowledge of the Antarctic is confined to the summer months of January, February, and the first weeks of March. No person has penetrated these regions at other seasons of the year. See POLAR EXPLORATION.

Ant-eaters (*Myrmecophagidae*), a family of South American mammals belonging to the insect-eating division of the order Edentata. The absence of teeth, the long head, tubular mouth, worm-like tongue, the marked development of the third digit of the fore-foot, and the insect diet, are prominent characteristics of this small family. (1) The largest form is the Great Ant-eater (*Myrmecophaga jubata*), or Ant-bear, as it is called in Demerara, which inhabits swampy regions in South and Central America. It measures 4 feet in length, not including the bushy tail, which is sometimes as long as the body. The long coarse hair is of a dark-gray colour, and a black band extends from the chest across the shoulder backwards. The skull is prolonged into a narrow snout. The ears and eyes are very small. The long worm-like tongue may be protruded to a length of 18 inches from the tubular mouth at the end of the muzzle, and is covered with a viscid secretion from large glands which extend back over the chest. By this means, the very abundant termites or white ants are caught in great

numbers as they issue from the invaded nest, and whipped with extraordinary rapidity into the mouth.



Great Ant-eater (*Myrmecophaga jubata*).

The internal opening of the nose is unusually far back in the mouth, as in crocodiles and whales. The posterior portion of the stomach forms a muscular gizzard in adaptation to the nature of the food. The third digit of the fore-foot is much larger than the three others, and bears a very powerful claw, which is used in breaking into the termite nests. In walking, the fore-toes are much bent, the pointed tips are protected by being turned inwards and upwards, and the animals thus rest their weight in a sort of club-footed fashion on the outer portions of the outer toes. The five toes of the hind-foot are almost equal, and bear strong claws; the broad sole rests on the ground. This form is wholly terrestrial, and has the reputation of being slothful, unsocial, and stupid. Like other insectivorous animals, it can live for prolonged periods without food. It spends much of its time in sleep, the long snout concealed in the fur of the breast, the hind and fore claws locked together, and the bushy tail thrown over all, as if for a shade from the sun. Though the collar-bones are rudimentary, the Great Ant-eater has great strength in its fore-legs, and is said to hug like the bear, so as to crush its enemy to death. The female bears but one at a birth, and carries it about on her back during its slow growth. The flesh is eaten by the Indians and negroes. Another much smaller form, the Tamandua (*T. tetradactyla*), is arboreal. The head is shorter, and the somewhat prehensile tail is scaly below and at the end. The Little Two-toed Ant-eater (*Cyclosum didactyla*) is also arboreal. The skull is still shorter, the fur is softer, the feet adapted for climbing, the collar-bones well developed, and the tapering tail thoroughly prehensile. (2) The Pangolin (q.v.), or Scaly Ant-eaters of the Old World, though closely related, belong to a different family, and are discussed elsewhere. The name Ant-eater is given at the Cape of Good Hope to the *Oryzomys capensis*, the Aardvark (q.v.) or Earth-hog of the Dutch colonists, a quadruped of about the same size as the great ant-eater of America, and belonging to the same natural order. (3) The Echidna of Australia are sometimes called Porcupine Ant-eaters; but though they agree with the above in the nature of their food, and in the sharp snout and protrusible tongue, their general structure is quite different. See ECHIDNA. (4) The *Myrmecobius fasciatus*, a small marsupial of Australia, is also called ant-eater.

Antecedent, a term in Logic, Grammar, and Mathematics. In Logic, it is a statement or proposition from which another is logically deduced. In Grammar, it is the substantive (word or clause) to which a relative points back. In Mathematics, we speak of the antecedent of a ratio—i.e. the first of two terms which compose the ratio; the first and third in a series of four proportionals.

Antediluvian (Lat. *ante*, 'before,' *diluvium*, 'the deluge') is the word used of anything that existed before the flood, in the patriarchal ages between Adam and Noah. The word is often employed in modern usage for anything antiquated or primitive, in a somewhat disparaging sense.

Antelopes (*Antilopidae*), a family of Mammalia belonging to the order of Ruminants (q.v.), and to the hollow-horned section of that order in which the horns consist of a horny sheath, surrounding a bony process of the skull, and are permanent, not annually renewed. In antelopes, however, the bony centre of the horns is solid and not occupied, as in those of goats, sheep, and oxen, to a considerable extent, with cells communicating with the frontal sinuses. They differ externally from goats in their beardless chin, and from them and sheep in the absence of longitudinal angles or ridges on the horns, which are, however, very generally marked with cross rings. The body is slender and deer-like, the feet small and elegant, the tail short and tufted, the hair generally short, and the colour often lively. Some species, however, have comparatively long hair; and a few which inhabit cold mountainous regions are clothed with wool mixed with longer and coarser hair, as in the Chamois (q.v.) of the Alps, Caucasus, &c.; the Rocky Mountain Goat (q.v.) of North America; and the Chiru of the Himalayas. Many species have *tear-pits* below the eyes, as in Deer (q.v.). The females of many species, as of deer, are destitute of horns; and if they alone came under observation, it would be difficult to say to which genus they belonged. The size is very various; the Guevi, or Pigmy Antelope of Africa (*Antelope pygmaea*), is only 8 to 9 inches high at the shoulders, whilst the largest forms measure 5 or 6 feet. Almost all the species of antelopes are peaceable, timid animals, and are distinguished by agility and fleetness. Most of them are gregarious. Some inhabit plains; others are found only in the most inaccessible mountainous regions; whilst others dwell in jungles and deep forests. Many, on the other hand, are water loving forms, and frequent the banks of rivers. North America possesses two species, found only in the western parts of the continent, the Prong-horn (*Antilocapra*) and the Rocky Mountain Goat (*Oreamnos*), which depart considerably from the typical character of the genus. It has been proposed to introduce the latter as a wool-bearing animal into the Highlands of Scotland. The Prong-horn sheds the horns annually like most species of deer. Europe produces only the Alpine Chamois and the Saiga (*A. saiga*), which inhabits the southern plains of Poland and Russia. Asia has about fifteen species; but the vast majority are found in Africa, and particularly in South Africa. The very numerous forms are arranged in sections or groups according to the peculiarities of the horns and other characters, but a satisfactory classification is difficult. The flesh of most antelopes is used for food, and they are therefore much hunted. In Africa some of the species exist in great numbers, and when severe drought occurs in the regions which they ordinarily inhabit, dense and multitudinous herds occasionally appear in the interior of Cape Colony, to the terrible devastation of the crops. Even the saigas of the Tartarian plains congregate in herds of many thousands in the end of autumn.

The name antelope is sometimes more particularly applied to a species also known as the Common or Indian Antelope, and as the Sasin. It is a native of India and the eastern parts of Asia, and is a beautiful animal about 2½ feet high at the shoulder, with erect, diverging horns, bent in a spiral of two or three turns. The hair is uniformly short, except that, as in many other species of antelopes, there are small tufts of bristles on the

knees. It inhabits open plains, and the herds exercise great watchfulness. Its fleetness is such that greyhounds chase it in vain; and it can easily bound over an inclosure of 11 feet in height, or over a distance of 10 or 12 yards. The flesh is held in small esteem, and the animal is less than many of its congeners an object of the chase.—The Saiga is a much less graceful animal, with short, somewhat lyre-shaped horns in the males only. These are used by the Russians and Chinese for the manufacture of many articles of domestic economy; and it is chiefly for their sake and that of the skin that the saiga is hunted, the flesh having a disagreeable taste, which is ascribed to the saline and aromatic plants of the steppes. The Dzeren (*A. gutturosa*), sometimes called the Chinese Antelope, and known among the Chinese by a name which signifies the Yellow Goat, is an inhabitant of the arid deserts of Central Asia. The flesh is highly esteemed. It derives its specific name from a large movable goitre-like protuberance on the throat of the old males, produced by a dilatation of the larynx. The Addax or Nubian Antelope (*A. addax*), which was known to the ancients, and is



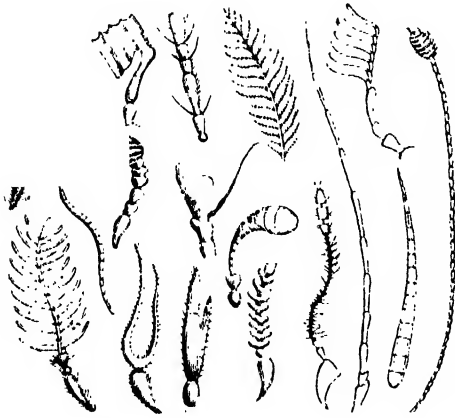
Addax (*Antelope addax*).

mentioned by Pliny, has horns very similar to those of the Indian Antelope, but is a larger animal, less graceful, with a slight mane on the neck, a tuft of long hair on the forehead, and large broad hoofs, adapted for treading on fine and loose sands. It inhabits the deserts of Central Africa, and, contrary to the usual habits of the genus, is said not to be gregarious, but to live in pairs. The Chikara and some other Indian species are distinguished by two additional rudimentary horns in front of the ordinary horns, and immediately over the orbits. The chikara inhabits thick forests and jungles. Like the addax, it lives in pairs; as do also the Steinbok of South Africa, an extremely graceful species, and the Kleenebok of the same country (*A. perpassilla*), a beautiful and active little creature with very small horns. The kleenebok is of a mild and gentle disposition, and extremely capable of domestication. The Gazelle (q.v.) of North Africa (*A. dorcas*), one of the species known to the ancients, is very frequently domesticated; and from its gracefulness of form, its gentleness of manners, and its bright black eyes, has afforded to the Arabian poets one of their most favourite objects of comparison. The South African Spring-bok (q.v.) is another very beautiful species, and is frequently domesticated by the colonists at the Cape of Good Hope. Among the numerous species which that country produces may



be mentioned also the Blauw-bok (*A. leucophaeus*), the Riet-bok (*A. arundinaceus*), and the Kaffrarian Oryx (q.v.). Still more worthy of notice among the South African species, but in some measure departing from the strict antelope type, is the Eland (q.v.), the largest of all the antelopes—an animal which may probably be found valuable in domestication. The Koodoo is another noble species allied to the eland. The Nyl-ghau (q.v.) of India and the Gnu (q.v.) of South Africa are also among the largest antelopes, but depart still further from the generic type. Less different from the ordinary type, but still with a marked approach to a bovine appearance, are the Bubalis of the ancients, frequenting the north of Africa, and the nearly allied Kaama or Harte-beest of the Cape of Good Hope. The flesh, skin, and horns of the antelopes have been widely utilised from early times. Antelopes may be grouped according to habitat, as desert, bush, rock, and plain forms. The Indian antelope has some religious significance, and the exaggerated development of a single horn in the Chinese antelope is supposed to have given some basis to the unicorn myth.

Antennæ, or feelers, the anterior appendages on the head of crustaceans, insects, and myriapods. The typical crustacean, such as a lobster, has two pairs of feelers, while insects and myriapods have only one pair. The name may also be applied to sensory processes on the head of some marine worms. They are really 'head-legs' modified for sensory purposes, and consist of a long series of joints, sometimes over 100 in number. They are supplied with nerve branches, and are used by the animals for feeling their way, for testing surrounding objects, and apparently for communicating with one



Various forms of Antennæ. (From Roget.)

another. Professor Graber has demonstrated the olfactory function of the antennæ of the cockroach, but some insects can smell their food even when robbed of their feelers. The smelling bristles of insects have been carefully studied by Braxton Hicks and Lowne in the case of the blowfly, where they occur very abundantly on the third joint of the antennæ. Peculiar sensory cones and knobs occur on the antennæ of some myriapods. The small antennæ of the lobster bear olfactory bristles, and have an ear lodged at the base. And in short there are numerous observations to justify the general statement that in many cases the antennæ are sensitive to smell, sound, and probably taste. Deprived of its antennæ, an ant, for instance, is peculiarly helpless.

Antequera (the *Antiquaria* of the Romans), an important town in the Spanish province of

Malaga, in a fertile plain on the left bank of the Guadalhorce, 65 miles W. of Granada by rail. Held by the Moors from 712 to 1410, it retains some portions of a commanding Moorish castle and of the ancient walls. It has a trade in oil and fruit, and some manufactures of woollens, silks, leather, and soap. Pop. (1884) 25,122.

Anthelia (Gr. *anti*, 'opposite,' and *hēlios*, 'the sun;'; Ger. *Gegensonne*) are luminous rings seen by an observer on a cloud or fog which lies opposite to the sun. They occur chiefly in alpine regions and in the polar seas, and are only seen when sunshine and cloud, or fog, occur at the same time. They appear in the following way: When, from an elevated position—as the mast of a ship, or the ridge of a hill—the shadow of an observer is projected by the sun on a cloud or fog, he sees the head encircled by a glory or luminous ring, diminishing in brightness as it leaves the head as a centre. When the sun shines brightly, and the fog is dense, as many as four concentric rings of this nature are seen by the observer round the shadow of his head, having their common centre in the point where a line from the sun through the eye of the observer meets the fog. When the phenomenon assumes this form, the rings are more or less coloured—the colours of the two inner rings being generally brilliant, those of the third more faint, while those of the fourth are scarcely perceptible. This last has an angular radius of about 40°, and is very seldom seen. It bears frequently the name of the Circle of Ulloa or the White Rainbow. A phenomenon substantially similar to the anthelia occurs when, the sun being near the horizon, the observer sees an aureole surrounding the shadow of his head cast upon grass or corn moistened with dew. The occurrence of anthelia is generally attributed to the Diffraction (q.v.) of light.

Anthem, a shortened form of ANTIPHON (Gr. *anti*, 'in return,' *phōnē*, 'voice;'; a piece sung in alternate parts), a species of musical composition introduced into the service of the English Church in the reign of Elizabeth, and appointed to be sung daily, at morning and evening service, after the third collect. The words of the anthem are taken from the Psalms, or other suitable parts of the Scriptures, and the music is either for solo, soli, or chorus, or a mixture of all three. As a specimen of English music, it can be heard to perfection in cathedrals and college chapels. In its origin, musical construction, and use, it is similar to the motett of the Romish Church, which name has been retained by the Lutheran Church. See MOTETT; also ANTIPHONY. The word is also loosely used, in such phrases as 'the National Anthem,' for what is rather a hymn.

Anthemis. See CHAMOMILE.

Anther. See STAMEN.

Antheridium, the male reproductive organs of many cryptogams (Ferns, Horsetails, Mosses, &c., q.v.). They may consist of a single cell, but are usually multicellular sacs, within which the thread-like male reproductive elements or antherozoids are produced. These are liberated by the rupture of the antheridium wall, and the antherozoid is enabled, by means of the lashing movement of its cilia, to reach and descend the tubular passage of the archegonium to the female cell, which it is its function to fertilise. See ALGÆ, FERN.

Anthology, from a Greek word meaning literally 'a collection of flowers,' is a title given to a work consisting of a series of choice thoughts, generally used solely of collections of poems. By far the most important is the Greek anthology, though the Latin anthology is also famous.

Greek Anthology.—The first Greek anthology deserving the name was compiled by Meleager of Gadara, in Syria, about 60 B.C. He called it a 'Garland' (*Stéphanos*), and included in it poems by himself and forty-six earlier poets—Archilochus, Alceus, Anacreon, Simonides, Sappho, and others. This collection was added to by four successive editors, and in the 10th century Constantine Cephalas made a new collection, containing the best in the earlier ones, with some additions. Maximus Planudes, in the 14th century, by his tasteless selection from the work of Cephalas, rather spoiled than increased the already existing store; but his excerpt was the only anthology known in the West until the 17th century. It was printed at Florence by Lascaris in 1494 and frequently re-edited, and translated by Grotius. Meanwhile, Salmassius had discovered in the Heidelberg Library (1606) the only extant manuscript of the older and richer anthology of Cephalas, and copied it. The Heidelberg MS. was subsequently carried to Rome and Paris, returning to its old home in 1816. The anthology, as Salmassius copied it, was not published till it was included by Brunck in *Anecdota* (1772-76); and this was superseded by the standard *Anthologia Græca* of F. Jacobs (13 vols. 1794-1803; improved in 1813-17). The edition in Didot's *Bibliotheca* (1864-72) is admirable. Good selections from the anthology are those of Weichert, Jacobs, and Meineke.

The Greek anthology contains specimens of 300 Greek poets at all periods of Greek civilisation—the old Hellenic, Alexandrian, and Byzantine, heathen and Christian—and is invaluable as a reflection of Greek thought, mainly in its most human side, illustrating, with a fullness not elsewhere found, domestic life and private feeling. Love songs, witty verses, and devout sentiment are found there side by side; the terse, pithy, dignified poem suitable for inscription (epigram in the old sense; see EPIGRAM) of the ancient time is followed by the florid, ornate writings of the later period. Nowhere is there to be found a richer variety of poetic life, greater delicacy of sentiment, a more pious serenity, a greater abundance of wise, true, and humane thoughts, than sparkle in the pages of the Greek anthology. There are English translations of selections by Wrangham, John Sterling, Merivale, Macgregor, and Garnett. See the little work on the anthology by Lord Neaves; Symond's *Studies of the Greek Poets* (1873); A. J. Butler's *Anacanth and Asphodel: Songs from the Greek Anthology* (1881).

Latin Anthology.—The ancient Romans had no proper anthologies. In 1573, Scaliger published at Leyden, in imitation of the Greek anthology, a Latin anthology, under the title *Cathecata Veterum Poetarum*, and Pitheüs one at Paris in 1590. A larger *Anthologia* was issued at Amsterdam (1759 and 1773) by Peter Burmann the Younger, a better arranged edition of which was published by Meyer in 1835. The first critical Latin anthology was that of Riese (1869-70), containing 942 poems of very various merit—some really admirable verses, and much that is artistically worthless.

Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject—and sometimes of 'beauties' of their best poets, with biographical notices, which are either placed in chronological order, or according to the countries in which the authors lived. The Arabic, Persian, and Turkish literatures are rich in anthologies; there are also Tartar, Indian, and Chinese collections of a similar kind.

The Golden Treasury of the Best Songs and Lyrical Poems in the English Language (1861), by

F. T. Palgrave, is a brief but admirable English anthology; Archbishop Trench's well-known *Household Book of English Poetry* (1868) is another work of a similar kind. A larger selection is the *English Poets*, edited by T. H. Ward (4 vols. 1880).

Anthos, CHARLES, LL.D., a well-known editor of classics, was born in New York in 1797. Educated at Columbia College, he was admitted to the bar in 1819; but next year was appointed adjunct-professor of Languages in Columbia College. In 1830 appeared his large edition of Horace. Five years later he became head of the classical department at Columbia College. A student of the most methodical habits, he was able to produce about fifty books, chiefly editions of the Latin classics and aids to classical study. His editions for a time were widely popular, even in England; more, however, from their superabundant explanations, with lazy schoolboys than with careful teachers. He died July 29, 1867.

Anthony, ST. See ANTONY, ST.

Anthozoa (Gr. *anthos*, 'a flower,' and *zoon*, 'an animal'), one of the three classes of Coelenterates (q.v.), including sea-anemones, dead-men's fingers, corals, &c. The commoner term is Actinozoa (q.v.).

Anthracene, ($C_{14}H_{10}$), is a substance obtained in the distillation of coal-tar. Although long known to chemists, it is as the source of artificial Alizarin (q.v.) that it has become of commercial value. By a process of oxidation with bichromate of potash, it is changed into anthraquinone, which in turn is treated first with sulphuric acid and then with potash, the alizarin being separated by the addition of hydrochloric acid. Conversely, anthracene is readily obtained from alizarin by heating that substance with zinc dust—a mixture of metallic zinc with oxide and hydrate of zinc when, by the absorption of hydrogen, anthracene is formed. When perfectly pure, it forms white pearly scales, melting at about 410° F. (210° C.), and at a higher temperature distilling without decomposition. It is insoluble in water, but readily dissolves in boiling alcohol, ether, or turpentine. When viewed by a ray of sunlight, it exhibits a fine blue fluorescence, if pure. The commercial article, dissolved in benzene, gives a green fluorescence. By prolonged exposure to light, it is changed into an isomeric body, *pyranthracene*, which again on fusion yields anthracene. Anthracene gives rise to a large number of compounds, formed by replacing part of the hydrogen which it contains with chlorine, alcohol radicals, &c., and accordingly named chloranthracene, methyl-anthracene, and so on.

Anthracite (Gr. *anthrax*, 'a coal'), or STONE COAL, is black, has a kind of iridescent or metallic lustre, is not readily ignited, and burns nearly without smell, smoke, or flame (hence, sometimes called *blind-coal*), giving out an intense heat. It consists almost entirely of carbon, and contains only a small proportion of the constituents of bitumen. It occurs in beds like common coal, and has doubtless had a similar vegetable origin. Common coal which has been subjected to the action of heat underground, loses its bituminous constituents and passes into anthracite. Thus many coals have been rendered anthracitic in the neighbourhood of intrusive igneous rocks. Anthracite is used for fuel like coke; it is in fact a kind of natural coke. It is employed in the burning of lime and bricks, the reduction of iron, &c. It is found largely in South Wales, and here and there in Scotland. The largest field of anthracite is in the coal region of Pennsylvania. See COAL.

Anthrax (Gr., 'a carbuncle'), the name now generally used of a widely-distributed and very

destructive disease, most common among sheep and cattle. Besides its practical importance, it has special theoretical interest, because it was the first infectious disease proved to be due to the presence of microscopic vegetable organisms (*bacilli*; see GERM THEORY), and because it has been more fully studied than any other analogous disease.

Synonymy and Distribution.—Anthrax has received many names; the most important are *Splenic Apoplexy*, *Splenic Fever*; as it occurs in man, *Malignant Pustule*, *Woolsorter's Disease*; in French, *Charbon*, *Sang de Rate*, *Mal de Sang*; in German, *Milzbrand*. It occurs in most countries of Europe, especially France, Germany, Austria, and Italy; in Turkey in Asia, Persia, China, South Africa, and South America; in Siberia, chiefly among horses, as *Siberian Plague*. The *Loathsome Fever* and *Poli Plague* of India, and the disease which was very fatal to horses and cattle in the Zulu war, are closely allied, if not identical. The disease of cattle, called *Black-leg* or *Quarter Evil*, though very similar, is now proved to be distinct from anthrax.

Animals affected.—Cattle and sheep are most commonly attacked by anthrax. Among horses and camels it is also very destructive. Rabbits, hares, mice, guinea-pigs are readily affected, and probably many other herbivorous mammals. It has been found that rats are susceptible to it when fed on vegetables, but not when on animal diet; and probably food has a similar influence in man. Carnivorous animals become affected with difficulty, if at all. Fowls can contract it, but only when their temperature, naturally higher than that of mammals, is artificially reduced.

Symptoms in Animals.—In the most acute (*apoplectic form*) cases, the animal falls as if it had received a severe blow, and goes into convulsions; the pulse is quickened, the breathing becomes rapid and laboured, and death follows in a few minutes or hours. In less acute cases, the animal loses its appetite, becomes thirsty and feverish, and often has bloody diarrhoea; may appear to recover, only to have a more severe seizure after a short interval; and in a fatal case dies with great emaciation, convulsions and laboured breathing, usually within two days of the first symptoms.

Occurrence and Symptoms in Man.—Anthrax does not readily attack man, and is very rarely communicated by one human being to another. It occurs in those whose occupations bring them into contact with diseased animals or their hides, wool, &c. i.e. butchers, farmers, porters, &c. In this country, the source of infection is generally imported wool or hides. Two distinct forms are met with: (1) *Internal Anthrax*, or *Woolsorter's Disease*; (2) *External Anthrax*, or *Malignant Pustule*. (1) Peculiar cases of rapid fatal illness had long been known to occur in those employed among wool from abroad, especially at and near Bradford, but were first identified with anthrax in 1879. The symptoms are much like those in animals, but less rapid; 'apoplectic form' cases are very rare, and death usually occurs between the third and seventh day after the first severe symptoms. In such cases the poison is probably inhaled, and enters the blood from the respiratory organs. (2) In *External Anthrax*, the poison is introduced through an abrasion or wound of the skin. The disease begins as a small red spot, but soon leads to destruction of the portion of skin involved, and inflammation of the surrounding tissues. The affected part now forms a defined hard hump surrounded by a soft swollen area of skin. There is a singular absence of pain and suppuration, which distinguishes it from the ordinary forms of inflammation. Within a few days of the first appearance of this *malignant pustule*, constitutional symptoms may

set in and run much the same course as internal anthrax. But at first the disease is a purely local one, and energetic treatment by excision or cauterisation of the affected tissues will prevent its becoming general, and save the patient from a probably fatal issue.

Post-mortem appearances vary much in detail in different animals. Generally speaking, the blood is dark and uncoagulated; most of the internal organs, particularly the spleen, are swollen and congested; jelly-like infiltrations, either yellow or in large measure composed of blood, are found in various situations, particularly where there is much loose connective tissue—e.g. beneath the peritoneum; there are hemorrhages into the tissues; and often fluid effusions in the serous cavities. On microscopic examination, the capillaries in affected parts are found distended with blood containing abundant *bacilli*; and the kidneys, spleen, &c. are inflamed.

Bacillus Anthracis.—The characteristic organism, the bacillus, which is the cause of this disease, consists of straight or slightly curved rod-shaped bodies, usually about 0.001 millimetre ($\frac{1}{250,000}$ in.) in thickness, and from 0.005 to 0.02 millimetre ($\frac{1}{20,000}$ to $\frac{1}{5,000}$ in.) in length. They are composed of a number of joints, rather longer than broad, each of which consists of an envelope with protoplasm in its interior. The rods increase in length by transverse division of these cells, never become branched, and are motionless. When they are exposed to the air (not within the animal body), bright glistening oval spores may be seen to develop within some of the cells. The bacilli can grow in any fluid containing nutritive material, and at any temperature between 15° and 45° C. (60° and 113° F.), best between 25° and 40° C. (77° and 104° F.). Provided air has free access to the bacilli, spores may form at any of these temperatures. While the bacilli themselves are readily killed by freezing, boiling, complete drying, or the action of antiseptics, the spores are extremely tenacious of life, and dry wool, blood, &c. containing them probably retain their virulence for years.

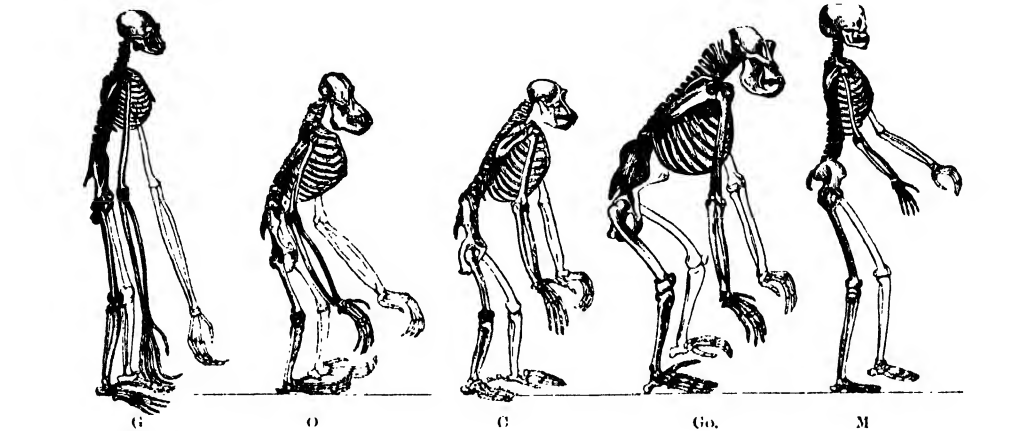
Preventive Inoculation (badly named 'animal vaccination'). In 1881 Pasteur announced that by cultivating this bacillus at 42–43° C. (108° F.), he was able to obtain a form which produced a modified anthrax in sheep and cattle inoculated with it, much less virulent and fatal than the ordinary disease; and that the animals thus treated were proof against the ordinary anthrax poison. The previous year Toussaint obtained similar results by a slightly different process. Subsequent experimenters have not fully confirmed Pasteur's results; but his method is largely employed on the Continent, frequently, though not always, with success. He stated in 1886 that half a million animals are inoculated annually for anthrax in France alone. Klein has found that the blood of white mice killed by anthrax produces a mild protective attack in sheep. Roy obtained similar results in the case of cattle and horses (but not sheep), with blood from the bisacha or prairie-dog, when investigating the disease in the Argentine Republic in 1883. Among other difficulties in the way of accurate results is the very different susceptibility to the disease even of different breeds of the same species of animal; e.g. one breed of sheep may be killed by a virus which produces a mild protective attack in another. At best, moreover, the immunity conferred by inoculation seems not to last more than a year.

These facts, and somewhat similar results obtained by inoculations in the case of other infectious diseases of animals (black-leg, chicken cholera, pleuro-pneumonia, or foot-and-mouth disease), have special interest from the analogies they present to smallpox and its prevention by vaccination, and

seem to point to indefinite possibilities in regard to methods of dealing with other similar maladies. See Reports of Medical Officer to Local Government Board for 1880-81-82-83; Koch *On Transmissible Infective Diseases* (1880); Klein in *The Practitioner* for 1884.

Anthropoid Apes, the highest and most man-like monkeys, including Gorilla, Chimpanzee, Orang-utan, Gibbon, and several other species. They are technically described by the Linnæan title Anthropomorpha, and readily distinguished, as tail-less, semi-erect, and long-armed, from the dog-like apes (Cynomorpha), which have also a narrow partition between the nostrils (Catarrhini), and also inhabit the Old World. With the decidedly lower flat-nosed New-World monkeys, or Platyrrhini, there is no possibility of confusion. The anthropoid apes are all arboreal, and inhabit Africa, South-eastern Asia, and the Malay Archipelago. In all, about a dozen species have been described with more or less definiteness. The family is of special interest and importance in connection with the views held by evolutionists as to the descent of man. It is recognised by anatomists that all the attempts to establish a fundamental distinction, on anatomical grounds, between the physical structure of the higher apes and that of man are futile. Generic differ-

ences, indeed, there are in abundance, but these establish only a difference of degree, and not of kind. Thus, in man, the great toe is not opposable to the others for grasping purposes, the angle between the face and the top of the skull does not exceed 120° , the teeth form an uninterrupted series, and so on; while the strong spines on the back of the gorilla's neck, the very marked eyebrow ridges in gorilla and chimpanzee, the especially long arms of the gibbon, and the protruding jaws of all the anthropoids, are equally characteristic adaptations to different ways of life. Even in the minutie of blood-vessels, muscles, nerves, and brain-convolutions, impartial observers have demonstrated the closest resemblance. The differences of structure between the lowest monkeys and the higher are far greater than those between man and any anthropoid ape, the resemblances being especially obvious when young forms are compared. In their expressions of cerebral activity, whether intellectual or emotional, the anthropoids come in some respects very near the lowest human tribes.



Skeletons of Anthropoid Apes compared with that of Man:

G, gibbon (for distinctness, given about twice the proportional size); O, orang-utan; C, chimpanzee; Go, gorilla; M, man. (After Huxley.)

orilla; M, man.

ences, indeed, there are in abundance, but these establish only a difference of degree, and not of kind. Thus, in man, the great toe is not opposable to the others for grasping purposes, the angle between the face and the top of the skull does not exceed 120° , the teeth form an uninterrupted series, and so on; while the strong spines on the back of the gorilla's neck, the very marked eyebrow ridges in gorilla and chimpanzee, the especially long arms of the gibbon, and the protruding jaws of all the anthropoids, are equally characteristic adaptations to different ways of life. Even in the minutie of blood-vessels, muscles, nerves, and brain-convolutions, impartial observers have demonstrated the closest resemblance. The differences of structure between the lowest monkeys and the higher are far greater than those between man and any anthropoid ape, the resemblances being especially obvious when young forms are compared. In their expressions of cerebral activity, whether intellectual or emotional, the anthropoids come in some respects very near the lowest human tribes.

On the other hand, while it is impossible to establish any fundamental distinction in physical structure between Homo and the Anthropomorpha, there is among evolutionists an equal consensus of opinion as to the impossibility of regarding any ape of any existing anthropoid species as in the direct line of human ancestry. As regards brain structure, the most man-like ape is the orang, while the chimpanzee has the most closely related skull, the gorilla the most human feet and hands, the gibbon the most similar chest. The study of anthropoid fossils has not yet discovered the remains of any form which can be accepted as the 'missing link,' although extinct anthropoids, such as *Dryopithecus*, unquestionably serve to lessen the distance to

be bridged over. The reader should consult Darwin's *Descent of Man*, Hæckel's *Anthropogeny*, Huxley *Man's Place in Nature*, and Hartmann's *Anthropoid Apes* (Internat. Sc. Series), where abundant references will be found. See EVOLUTION, MAN (*Descent of*); and APE, CHIMPANZEE, GIBBON, GORILLA, MONKEYS, ORANG.

Anthropolatry (Gr., 'man-worship'), the worship of man, the giving of divine honours to a human being, a term always employed in reproach. Thus, the early Christians accused the heathens of anthropolatry, because, in their mythology, men were represented as exalted among the gods, although an *Apotheosis* (q.v.) was in these cases alleged by their worshippers; and the heathens retorted the charge because of the worship of Christ, the reply to which was the assertion of his divinity. But the term is chiefly known in ecclesiastical history in connection with the employment of it by the Apollinarians (q.v.) against the orthodox Christians of the 4th and 5th centuries, with reference to the doctrine of the perfect human nature of Christ.

Anthropology is the science of Man, and more especially of man considered as a social animal.

Strictly speaking, there can be no one science of man: various parts of our knowledge of our own species fall under the head of various distinct sciences. For example, viewed as an animal organism merely, the scientific consideration of man's body belongs to the province of Biology, and in particular of that branch of it known as Zoology. Again, man's structure and functions, regarded separately, belong to the province of Anatomy and of Physiology. His mind and all his mental phenomena fall similarly under the head of Psychology. The facts and theories as to his speech

and languages range themselves under the subordinate science of Philology. And so forth throughout. Nevertheless, from two distinct points of view, it may be fairly urged that a single unified science of anthropology does and ought properly to exist. In the first place, man is of immense relative importance to man; and on this ground alone it has been held desirable that the principal facts as to man's nature, origin, and history should be considered in their totality at a single glance, and with special reference to himself alone. In the second place, man is an animal so complex, so varied, so superior to all the other animals, that many aspects of his life must be scientifically examined, which do not exist at all, or exist only in a very slight degree, in the case of all other groups of organisms. More especially may it be asserted that man, as a social animal, enters into mutual relations of such unusual complexity, whether in the family, the clan, the tribe, or the nation, that a special science is imperatively needed to take cognisance of these higher social phenomena. For this science, Auguste Comte, one of the first who recognised its necessity, proposed the name of Sociology (q.v.), a name since adopted by Mr Herbert Spencer and other high authorities.

As to man's origin, two main views may be said at present to contest the field. The one, heretofore the usual belief, is based either upon the literal interpretation of Scripture or upon natural theology, and regards him as a distinct creation, separate from and superior to the remaining animals. The other, accepted by many competent biological authorities, regards him as descended from a hairy quadrumanous arboreal animal, more or less remotely allied to the anthropoid apes. This theory of his antecedents, faintly foreshadowed by Lord Monboddo in the 18th century, was more definitely propounded a little later by Buffon, Helvetius, Lamarck, and Erasmus Darwin, and was at last elaborated in profuse detail by Charles Darwin, whose *Descent of Man* forms the great storehouse of information and speculation on the question. Huxley's *Man's Place in Nature* may likewise be consulted on this branch of the subject, as may also Lyell's *Antiquity of Man*, and Dr E. B. Tylor's *Anthropology*. The other side of the question is ably argued in A. de Quatrefages' *Races Humaines* (Par. 1887). His view, till recently the only theory of man's origin, is still the one mainly accepted by orthodox thinkers, and supported by several biological specialists. As regards the period of man's first appearance on the earth, that problem must be, from the evolutionary point of view at least, to some extent a merely verbal one; because if man be really developed from some lower form, there could never have come any particular moment in the course of his evolution when he began to be a man, and ceased to be a man-like ape. But beings who were undoubtedly men in the fullest sense are known to have existed in Quaternary times; while much evidence has been adduced for pushing back the advent of man on earth to the Pliocene, and even to the Miocene period. On this point, however, see MAN (*Antiquity of*).

When man first appears before us in recognisable form, he appears as an erect animal, intelligent and social, endowed with articulate speech, and capable of manufacturing weapons and implements of stone, bone, wood, and other like materials. All questions as to how, on the evolutionist theory, he acquired the erect habit, already partially foreshadowed in the anthropoid apes and how he lost the hairy covering of his body, belong strictly to the domain of anthropology, and have been argued out by Darwin, Huxley, Wallace, and others. For the peculiarly human gift of articu-

late speech, often regarded as the absolute differentia of humanity, see LANGUAGE. The unusual intelligence and mechanical ability of man are closely correlated with his large brain; and the oldest skulls yet discovered show that this exceptional development of the brain dates back to a very early period. Similarly, it is for the most part by his works and tools, indicating a high degree of intelligence, that we trace the existence of man in geological time. The fire-marked stone implements from the Calcaire de Beauce, regarded by the Abbé Bourgeois and M. Gabriel de Mortillet as of human origin, perhaps afford the first indications of his presence in Tertiary times; the Quaternary cave-deposits and the drift yield stone-hatchets and arrow-heads of more shapely make, and artistic remains of primitive pictorial type far from despicable (see ARCHAEOLOGY and ART).

From the very beginning, man thus shows himself as emphatically a possessor of arts and knowledge. He alone can produce fire; and this acquaintance with fire and with the art of cooking has also frequently been regarded as the most distinctive characteristic of the human race. Fire was probably first obtained either from flint sparks, which would be observed in the act of chipping stone implements; or by means of the fire-drill, which would immediately be suggested in the act of drilling bone-needles (such as were used by the cave-men), or in the course of manufacturing shafts for arrow-heads. Clothing and decoration are also early peculiarities of man. Alone among animals, he covers himself with the skins of the beasts he has slain, and adorns himself with feathers, shells, teeth, and bones. From these simple beginnings, all the arts gradually arise. Implements slowly differentiate themselves with use into weapons on the one hand, and tools on the other. The earliest stone-axe, held apparently in the hand alone, without hafting, yields place with time to its more developed varieties, the hafted axe, the scraper, the chisel, the gouge, the drill, the arrow-head, and the lance-head, all alike chipped in stone; and these, once more, by slow degrees, give way to the newer ground and polished neolithic weapons and tools, and finally to metallic implements generally. The dug-out canoe, in like manner, leads on to the coracle, the bark canoe, the boat, the ship, and at last the steamer. Clothing sets out with skins and necklets; it quickly reaches the stage of grass kirtles and feather cloaks; and as soon as the art of weaving is discovered, it goes on to linen, cotton, silk, and velvet.

According to the more general theory of creation, man's first home was in Eden, the position of which has been greatly debated. But if we accept the evolutionary view, man perhaps had his origin in the torrid region of Asia or Africa, still the home of the anthropoid apes; for the tropics are the headquarters of the Primates, and the fossil fauna of Europe is poor in Quadrumana, while those of America and Australia do not exhibit their remains at all. In the beginning, according to their theory, man was apparently homogeneous a single species, speaking a single primitive rude tongue (largely eked out by signs and gesture-language), and not divided into distinct varieties. At an early period, however, the species broke up into several races, now inhabiting various parts of the world, for which see ETHNOLOGY. It is a peculiarity of our species, indeed, to be strictly cosmopolitan, inhabiting all climatic zones, and found in every portion of earth except a few oceanic islands; and this universal diffusion has doubtless largely influenced race-characteristics, and by the separation it involves, has greatly increased the number and variety of anthropological problems. Similarly, it

has given rise to the immense complexity of existing languages, for whose classification and affinities see *PHILOLOGY*. In various countries, man, under the influence of the physical and social environment, has developed diversely; has organised his family and his government on different models; has domesticated different animals—here the sheep and cow, there the horse and camel, yonder again the llama and alpaca; has cultivated different plants; has evolved different arts and sciences. The consideration of these diverse developments belongs strictly to the domain of anthropology.

In his earliest state, man appears to have been a hunter and a fisher: in the Quaternary caves, his remains are associated with harpoons and fish-hooks, and with the bones of the animals he employed for food. But he was also probably to a great extent dependent for support upon fruits and leaves, roots and seeds. This is still the condition of the lowest savages, of the Andaman Islanders, the Digger Indians, the Australian black-fellows, and the Melanesian Negritos. The Australian has for his chief weapon and hunting instrument the Boomerang (q.v.): he digs the ground with a pointed stick for tubers, roots, and a kind of large truffle. From this earliest and lowest stage we get advance first in the direction of the higher hunter life, represented by the Quaternary cave-men and the modern Eskimo, who fashion shapely harpoons for seal or walrus, frame themselves canoes of some skill, and dress from head to foot in furs neatly stitched together into good garments. The next advance is to the rudiments of agriculture, already shown in the lake dwellings of Switzerland, where the remains are found of several cereals inferior in size to those of the present day. It is usual, indeed, to divide the history of mankind into three stages, the hunting, the pastoral, and the agricultural; and this division is on the whole good. But rudiments of agriculture seem in most cases to antedate the pastoral condition. Even the Melanesians cultivate small plots of yam and taro. The North American Indians, before the arrival of Europeans, were mostly still in the hunting stage; on the prairies, they depended chiefly for support on the bison; farther north and east, on the deer, elk, and other forestine animals. But in Mexico, maize and cassava were tilled; and in Peru, the potato formed the staple food, while the llamas and alpacas were used both for burden and food. The earliest known domestic animal was the dog, found in Australia and in the Danish shell-mounds; next, perhaps, came the pig, found in Polynesia; then the reindeer; later, the sheep, cow, horse, goat, camel, elephant, yak, and cat. The nomad Mongolian of Central Asia lives mainly on the produce of his flocks and herds, especially mare's milk. Agriculture is found even in New Caledonia, where the natives cultivate local roots; throughout Polynesia, the cocoa-nut and the bread-fruit long formed the staple food; in the Malayan region, the banana (now universally raised in tropical climates) was the main staff of life. Yam, sweet potato, sago, and sugar-cane are also important tropical esculents. In Europe and Asia, the cereals, especially wheat, oats, rye, rice, barley, and millet, form the chief agricultural products. Dates and sorghum are of great value in Africa. On the origin of this, see De Candolle, *Origin of Cultivated Plants*; on the domesticated animals, Darwin, *Variation under Domestication*. Agriculture began in small plots worked by hand and spade, or stick: it progressed next to the wide valleys of the Nile, the Euphrates, the Ganges, the Indus, and the Chinese rivers. It owes much to the invention of the plough. Cookery, fire, the art of grinding, the mill, the flail, the thrashing-machine, the winnowing-machine, all

contribute their share to the gradual building up of civilisation.

Man alone also indulges in intoxicating, stupefying, or exciting substances, such as alcohol (in its various forms of wine, beer, whisky, kummiss, &c.), tobacco, bhang, opium, hashish, kava, and coca.

In the material life of man, the most important element, after food, is that which relates to warmth and shelter—the house, clothing, fire, and covering. Caves and rock-shelters seem to have formed the earliest houses; upon these, the wigwam of leaves and branches is a natural advance among forestine peoples. Some few wild races still live and sleep entirely in the open air, but most human beings have at least a temporary place of residence, a tent, van, wigwam, cabin, crannog, or snow-lut. Architecture is concerned with the evolution of these to the modern mansion, palace, or cathedral. Clothing originated, it would seem, in ornament, but its use for warmth must also have come very early. A few savages still go stark naked, and so apparently (to judge from their sketches) did the men of the older stone age; but the loins, at least, are generally clad, and among higher races the whole body also. Painting and tattooing, though solely decorative in character, may likewise be considered under this head, as well as the deformations and mutilations of various parts of the body, frequently practised by many savages. These, though originally perhaps (as Mr Herbert Spencer believes) ceremonial or religious in character, have now, for the most part, assumed a purely tribal or aesthetic meaning. Important in the same general connection is the evolution of household furniture: a bed of some sort, be it only of grass or dead leaves, seems all but universal among human beings; the stool or chair is almost equally ancient; coverlets, blankets, sofas, and so forth, gradually follow. The fire and cookery imply some sort of rude vessels; at first, no doubt, calabashes and cocoanuts, gourds and skins, horns and skulls; then at last Pottery (q.v.), moulded originally as moist clay round natural forms to prevent them from burning when placed upon the fire, and at last assuming the definite shape of an independent art. On the evolution of these, as of jewelry, hair-dressing, and other similar domestic arts, see in details under those various headings.

Among the practices most distinctive of man may be reckoned war; for though the lower animals fight among themselves, they seldom do so in organised bodies. War is a result of the social habits of man, and itself has been instrumental in bringing about many of the higher human developments. Besides its direct effect in producing the gradual evolution of weapons (as distinguished from tools), setting out with the stone axe, and ending with the Armstrong gun, the rifle, and the ironclad, it has had an immense indirect effect in begetting civil organisations, welding together men under military discipline, determining the monarchical form of government, and consolidating independent tribes and nations under one great centralised despotism. War is also probably answerable for the institution of slavery (the slave being at first the captive in battle) as well as for the existence of caste and many other social distinctions. It seems likely that cannibalism is a direct result of war; and at least one great military despotism, that of Mexico (q.v.), was absolutely founded upon cannibalism, which there assumed a marked governmental and religious importance.

The question as to the rise of marriage and of the family life forms another large department of anthropology. Promiscuity, or so-called communal marriage, seems, according to recent investigators, to have been the aboriginal practice of savage men. From this natural state, two main lines seem to

diverge. Where female infanticide is practised, the number of women becomes insufficient for the men, and polyandry is the result. But elsewhere, starting from so-called marriage by capture, where each man stole a woman for himself from another tribe, we get evolved the more familiar polygamous or monogamic family. The problems of anthropology in this respect, the varieties of exogamy and endogamy, the rise of polygamy, and its gradual evolution into monogamy, have been traced in McLennan's *Primitive Marriage*, Morgan's *Systems of Consanguinity and Affinity*, Tylor's *Primitive Culture*, Herbert Spencer's *Principles of Sociology*, and Letourneau's *Sociology*. Closely connected with this aspect of the subject are all questions as to the position of woman, her legal and social status; the constitution of the family, patriarchal, matriarchal, or slave-owning; the various methods of reckoning kinship; prohibited degrees; the claims of the children; divorce, widowhood, second marriage, and the practice of suttee. Among the more interesting of these developments may be mentioned Totemism (q.v.), a subject largely elucidated in Mr Andrew Lang's *Custom and Myth* (1884), and *Myth, Ritual, and Religion* (1887).

The exact relations of the family to the tribe remain open to much doubt. But almost everywhere human society, in its early stages, resolves itself into such little groups, more or less loosely held together, and occupying, as a rule (except among nomads), a definite and circumscribed piece of territory. The tribe is least marked among the lowest races the Vedda of Ceylon, the Andamanese, the Eskimo, who exist almost as families alone, without subordination or headship; it gradually expands, as we move upwards, into the nation, the kingdom, and the empire. The earliest tribes are kingless and formless; they have no definite organisation. But war usually produces kingship, and in tribes that have long been predatory and militant in type, the kingship hardens into a fixed despotism. The various influences of militancy and industrialism, the growth of the different types of government, and the rise of free institutions and of legislative bodies, have been admirably traced in Mr Herbert Spencer's *Principles of Sociology*. In his *Ceremonial Institutions* he has also shown the importance of that system of etiquette which rules the lives of men in all societies from day to day, and constitutes in its own way a form of government scarcely less imperative than the political authority. The manners and customs of savage and semi-civilised people, often very extraordinary and disgusting, form a large department of anthropological science. Law is also a branch of sociology to be affiliated here; and the growth of the idea of property belongs similarly to this part of the science of anthropology. Sir Henry Sumner Maine's works may be consulted upon this subject.

Man is one of the few animals to pay special attention to his dead. Funeral rites differ much from place to place, and form a special subject of anthropological study. Tumuli, pyramids, standing-stones, and other forms of funeral monument, have each their history and implications. Especially does man almost everywhere believe in some sort of survival of the individual after death, and in the existence within himself of a soul or spirit, which outlives its fleshy habitation. The origin of Religion (q.v.) is largely connected with these ideas of a future life and a future world. Herbert Spencer traces it directly to the theory of ghosts and ancestor-worship; Dr Tylor, to what he calls Animism (q.v.), or the belief in souls universally pervading all natural objects. At anyrate, anthropology has to deal on this side with the growth of worship, of the fetish, of the ghost, and of myth; the ideas of gods, demons, and

supernatural beings generally; the rise of altars, temples, mosques, and churches; the notion of sacrifice; and the various great creeds of the world—heathenism, fetishism, Shamanism, Hinduism, Shintoism, Buddhism, Judaism, Islam, and Christianity. A special side of this department of anthropology is Comparative Mythology (q.v.). Max Müller's works present one aspect of this subject; Lang's *Custom and Myth*, and *Myth, Ritual, and Religion*, Todd's *Myths and Dreams*, and Spencer's *Sociology*, show the other.

Ethics and moral philosophy are from this standpoint a branch of anthropology, touching on the one side upon religion, and on the other side upon law and the social relations. Political economy may also be regarded as a closely allied branch of anthropological science.

Finally, æsthetics, and the history of the arts and sciences, have themselves their anthropological aspect. The history of civilisation; the art of dancing, and of vocal and instrumental music; painting and sculpture; architecture; decoration; navigation; communications; education; picture-language, hieroglyphics, and alphabetic writing; in short, all that specially appertains to human life, savage or civilised, ancient or modern, all the world over, falls somewhere into its proper place as a part of anthropology.

For the general study of the subject, see especially the writings of Broca, regarded by many as the real founder of anthropology; Lubbock, *Prehistoric Times* (1865), and *Origin of Civilisation* (1870); Tylor, *Researches into the Early History of Mankind* (1865), *Primitive Culture* (1871), and *Anthropology* (1881); Bagehot, *Physics and Politics* (1872); Herbert Spencer, *Principles of Sociology* (1876 et seq.); Letourneau, *Sociology* (Eng. trans. 1877); Waitz, *Anthropologie der Naturvölker* (vols. I.-IV., 1859-65; vols. v. vi. by Gerland, 1867-71); and the *Dictionnaire des Sciences Anthropologiques* (1882 et seq.). Special journals are the *Zeitschrift für Ethnologie*, founded 1868; *Revue d'Anthropologie*, founded 1865. The London Anthropological Institute issues *Memoirs* and other authorised publications. For works on the various particular branches, see separately under the special headings.

Anthropometry. the measurement of the human body to discover its exact dimensions and the proportions of its parts, for comparison with its dimensions at different periods, or in different races or classes. Cranial measurements have long been adopted by anthropologists as the basis of their classifications of races; but the conformation of the skull and the relation of its height to its breadth vary so much within the same tribe, as not to be of themselves sufficient data on which to rest generalisations. M. Quetelet defined the general types of mankind by measuring, with reference to such particular qualities as height, weight, complexion, and the like, a certain number of men, and selecting as the standard the most numerous group on both sides of which the groups decrease in number as they vary in type, he arrives at the typical *mean* man of a population. As a basis of comparison, this is infinitely more valuable than an average which may be calculated from a few individuals, and those frequently exceptional rather than normal types. See Quetelet's *Anthropométrie* (Brussels, 1871). The French anthropologists depend much more on anthropometry than the English, and have adopted a form of schedule containing as many as 102 different observations of a single individual. Dr René Collignon reduced these for practical use to about 20, and with five simple instruments made a series of anthropometric observations of 280 French recruits from the different provinces of France, which he read before the Society of Anthropology at Paris in June 1883—an excellent example of the value of this method. The 'anthropometric committee' of the English Anthropological Society

distributed the average stature of British adult males into racial elements as follows: Early British, 66·6 inches; Saxon, 67·2; Scandinavian, 68·3; Anglian, 68·7. Similar detailed anthropometric measurements will be seen in the special anthropological journals, French, English, and German, and in the more scientific of recent books of travel. At his 'anthropometric laboratory' in the London Health Exhibition (1883-84), Mr Francis Galton made seventeen different measurements of 9337 individuals, and afterwards laid his methods and results before the Anthropological Institute.

Anthropomorphism (Gr. *anthrōpos*, 'man,' and *morphe*, 'form'), the application, in a figurative way, to God, of terms which properly relate to human beings. Thus, in the Scriptures, we read of the eye, the ear, the arm, the hand of God; and of his remembering and forgetting. This appears to arise of necessity from our incapacity of forming conceptions of things spiritual, or finding any terms in which to express them, except by analogies derived from things cognisable by our senses, so that even the language of adoration is borrowed from the familiar things of this world. Anthropomorphism, too grossly understood, has led at various times in the history of the Christian Church to the form and parts of man being ascribed to the Divine Being. Thus the Audavans, a Syrian monastic sect which sprang up in the 4th century, were accused of holding that God was possessed of a human shape, and that the words 'God created man in his own image' are to be understood of this shape literally. The language of the Mormons is highly anthropomorphic. A tendency to anthropomorphism may indeed be regarded as always existing, and to a certain extent it is true that the human mind must rest on human analogies in its highest abstractions. Limiting the question for the sake of argument to natural grounds alone, we must explain not a little of the great success of Christianity in the history of the world to the marvellous manner in which the divine is unfolded through the human in the central figure; and such phenomena as apotheosis and canonisation, to say nothing of the cruder animism of less civilised conceptions, still show how natural and easy it comes to us to express the divine in terms of the human. Such a representation of the divine, moreover, has found countenance from the speculations of philosophers. Hobbes and Priestley ascribed to the Divine Being a sort of subtle body. Fichte, on the other hand, rejected the very doctrine of the personality of the Divine Being as anthropomorphic, and represented God as the moral order of the universe; Spinoza was resolutely anti-anthropomorphic in all his thoughts of God; and Feuerbach substituted for the objective personality of God a subjective consciousness of God in the human soul.—The term *Anthropopathism* is sometimes employed to denote the ascription to God of human affections and passions, though indeed this is really included in the more general term. The language of Scripture, in the many instances of this kind, must be interpreted according to the same general principles which are applicable in those of anthropomorphism strictly so called, with the same discrimination of the figurative from the literal, and the same constant recognition of the absolute spirituality of God.

Anthropophagi. See CANNIBAL.

Anthus and Anthida. See PIPIT.

Anthyllis. See KIDNEY VETCH.

Antiaris, Antjar. See UPAS.

Antibes (anc. *Antipolis*), a fortified seaport in the French department of Alpes Maritimes, 7½

miles S. of Cannes. The harbour is serviceable only for small craft. It is a military station of the third rank, possesses a naval school, and has considerable trade in anchovies, olives, dried fruits, salt-fish, oil, &c. Pop. (1881) 4565. Antibes is a very old place, having been founded by a colony of Greeks from Massilia (Marseilles), of which it was a dependency. In the time of Augustus it was elevated to the rank of an Italian city, and many ruins still testify to its ancient prosperity. In the Austrian War of Succession, it was severely bombarded by Browne during a three months' siege (1746). The *Antibes Legion*, a body of foreign troops, chiefly French, kept by the pope during the French occupation of Rome, was formed here.

Anti-burghers. The name of a former religious denomination in Scotland. See UNITED PRESBYTERIAN CHURCH.

Antichlor was the name formerly applied to commercial sulphite of soda by paper makers, but now usually restricted to hyposulphite of soda. When the rags are reduced to a pulp, they are bleached by chloride of lime (bleaching-powder), which thoroughly soaks the pulp, and is very difficult to wash out. The traces of chlorine thus left in the pulp pass into the manufactured paper, and tend to bleach the writing-ink which may be traced thereon. To free the pulp from the residue of the chlorine, some hyposulphite of soda is employed, and hence the name antichlor, which literally signifies 'against (*anti*) chlorine.'

Antichrist, a name which occurs only in the epistles of St John, and is identified by different writers with more or less probability with false Christs, and other enemies of Christianity. The Greek preposition *anti* has the twofold meaning of substitution and of opposition; and the two meanings of a rival of Christ or pretender to the Messiahship, and an opponent, are mixed up in the early Christian conceptions of antichrist, in which various stages of development are to be distinguished.

(1) The 'false Christs,' whose appearance was predicted by Jesus as to precede the coming of the Son of Man (Matt. xxiv.), were pretenders whose success would depend on their acting in harmony with the popular expectations regarding the Messiah, but showing no special opposition to the Gospel. There is nothing peculiar to Christianity in this idea, for a number of pretenders to the Messiahship appeared among the Jews, both before and after the time of Christ. The other idea of opposition on the part of an antimessiah was also a familiar one (cf. 1 John, ii. 18). Its earliest form in Jewish thought is probably that of a warrior-king, Gog (Ez. xxxviii.). To this were subsequently added, by the rabbinical imagination, features borrowed not only from Antiochus Epiphanes, who is depicted in the book of Daniel (ii. viii. xi.), and who was regarded as the type of enmity against the kingdom of God, but from all the Old Testament enemies of Israel: Balaam, Goliath, &c.—and even from oriental myths and traditions; all combined and personified under the name 'Armillus.' In reference to the after development of the Christian conception, it is to be noticed that the false Christs of Matt. xxiv. are Jews, who by their pretensions are to bring trouble upon their nation.

(2) The development of this conception is apparent in the epistles of St Paul, inasmuch as the element of hostility to the Gospel is distinctly present. The apostle to the Gentiles had to bear the brunt of Jewish opposition (cf. 1 Thess. ii. 15), and the 'Man of Sin,' in whom this opposition came to a head, can only be a Jew, since he regards the temple at Jerusalem as the seat of God's worship

(2 Thess. ii. 3, 4); whilst the Roman power, by which he had repeatedly been delivered from the fanaticism of his countrymen, would appear to be the hindrance by which Jewish enmity was held in check, till the time appointed for its complete manifestation (2 Thess. ii. 7, 8). The idea of a false Christ was also blended with that of a spiritual antichrist (see 4 below). Whether as the hero of the Jewish revolution, or as false teachers, the 'Man of Sin' was a mere human representative of Satan, the instigator of all wickedness (2 Thess. ii. 9; cf. 2 Cor. vi. 14, 15).

(3) In the third stage, which is represented in the Apocalypse, antichrist is identified with heathenism. Till the time of Nero, the Christians had never come into direct collision with the Roman power; but by them, as well as by Jews, the Roman empire was now regarded as the fourth kingdom of Daniel's vision (ii.). Caligula, by ordering his image to be set up in the Holy of Holies, had rep. ated 'the abomination of desolation' (Matt. xxiv. 15; Dan. xii. 11), and proved himself the antitype of Antiochus. And when Nero, after the burning of Rome, made a scapegoat of the Christians, so that they were subjected to all the tortures that a fiendish ingenuity could devise, it was only natural that this monster of cruelty and vice should appear to them the incarnation of wickedness, the antichrist, a wild beast out of the bottomless pit (Rev. xi. 7, xii. 3, xiii. 1-6). The popular belief that Nero would reappear from the East after his death, whether expressed in Rev. xvii. 8 or not, was probably due to the supposed parallel between Christ and antichrist; the return of the one required the return of the other. The names to which the number of the Beast (666, Rev. xiii. 18) has been found to apply, from the end of the 1st century to the present day, are innumerable (see Schnaff's *History of the Christian Church*). That of Nero has always been in the list, but it is quite a recent discovery, made by several scholars independently and almost universally accepted, that his name answers to it exactly in Hebrew characters; although even thus the necessary application to Nero is disputed in one of the latest and best orthodox interpretations of the Apocalypse (Milligan, *Baird Lecture*, 1886). See APOCALYPTIC NUMBER. In recent times Mohammed, the Grand Turk, Napoleon I., and Napoleon III., have all been identified with antichrist.

(4) A fourth phase of the New Testament conception of antichrist appears in the Epistles of St John, in which the name first occurs (1 John, ii. 18). Antichrist was a spirit animating certain teachers within the church itself. Indeed, just as in the general aspect of the Pauline conception, the real antichrist is Satan, whose representatives the false teachers are; it is they who are the teachers of error, the ministers of the god of this world; the conflict is between truth and error, light and darkness, Christ and Belial (1 John, ii. 19, iv. 1-6). Many of the Reformers treated the pope as antichrist; and in the Schmalkald articles, the identification, long held to by many Protestants in all lands, became a part of Lutheran doctrine. See Davidson's *Introduction to the New Testament* (1868); Renan's *L'Antichrist* (1873); Philipp's *Die Kirchliche und Biblische Lehre vom Antichrist* (1877); Farrar's *Early Days of Christianity* (1884).

Anticlimax, as opposed to Climax (q.v.), is the addition to a statement of a particular which, instead of heightening the effect, renders the whole ludicrous: nearly equal to Bathos (q.v.). Thus: 'He was eminently truthful in all things. I do not believe he would have told a falsehood, even on his oath' (Hodgson's *Errors in the Use of English*, p. 217).

Anticline (Gr. *anti*, 'against,' *klineo*, 'I bend'), in Geology, applied to strata which are inclined in opposite directions from a common axis—that is, in a roof-like form. *Saddleback* is another term used for the same structure. *Syncline* (Gr. *syn*, 'together,' and *klineo*) is the converse of anticline, and is applied to strata which are inclined in



a, Anticline; s, Syncline.

opposite directions towards a common axis. Anticlinal and synclinal structures have resulted from the lateral compression and consequent folding of formerly horizontal or approximately horizontal strata. See under GEOLOGY.

Anti-corn-law League. See CORN-LAWS.

Anticosti, an island in the Gulf of St Lawrence, which it divides into two channels, with lighthouses at different parts of the coast, and about 140 miles long, and 30 miles broad in the centre. The hills in the interior rise to about 600 feet. Anticosti has two good havens, one at Ellice Bay, near the western end, and the other at Fox Bay, in the NW. The climate is severe; while the surface is an alternation of rocks and swamps. It is visited by fishermen in the summer, but there are hardly any inhabitants save lighthouse-keepers and a few officials. The island, which is attached to the Canadian province of Quebec, has considerable salmon, trout, cod, and herring fisheries, and is a resort for seal and bear hunting. Extensive peat deposits are found in Anticosti. Marl also occurs. In 1882 Anticosti was in the market for sale, and in 1886 attempts were made by an English company at its colonisation and settlement.

Anticyra. (1) the modern Aspraspitia, an ancient Greek town in Phocis, built on a peninsula in a bay on the Corinthian Gulf. In its neighbourhood grew the best hellebore, a sovereign remedy with the ancients for madness, hence the well-known proverb, *Naviget Antigram* ('Let him sail to Anticyra'), spoken of a person when he acted senselessly. (2) A town of Thessaly, on the Simus Maliaeus, also noted for its hellebore. (3) A town of Locris, at the entrance of the Corinthian Gulf, often confounded with the Anticyra in Phocis. Horace (*Ars Poetica*, 300) speaks as if all three places produced hellebore, *Tribus Anticyris caput insanabile* ('a head not to be cured by the three Anticyras').

Antidote (Gr., 'given against'), a counter-poison. See POISONS.

Antietam, a narrow but deep river in Maryland, United States, falling into the Potomac 7 miles above Harper's Ferry. On its banks, near Sharpsburg, was fought a bloody battle between the Union troops under McClellan, and the Confederate army under Lee, in which the former remained master of the field, though at a loss of nearly 13,000 men.

Antifebrin, or ACETANILID, introduced in 1886 as a febrifuge, the cheapness of which, combined with its rapidity of action and its non-poisonous nature, have brought it rapidly into favour as a substitute for quinine. A white colourless powder, with burning taste, it is almost insoluble in cold water, though readily soluble in alcohol. It is derived from anilin, to which

it is closely allied, its chemical formula being $C_6H_5NHC_6H_5O$.

Antigone, daughter of Oedipus by his own mother Jocasta, and sister of Eteocles, Polyneices, and Ismene. She accompanied her father in his exile to Colonus in Attica, and after his death, returned to Thebes. When her brothers, Eteocles and Polyneices, had both fallen in single combat, and Creon had forbidden on pain of death the burial of the latter, Antigone alone dared disobey. She covered her brother's body with earth, and was in consequence shut up in a subterranean cave, where she perished. Her lover, Haemon, son of Creon, destroyed himself beside her corpse. Antigone, as the ideal of feminine duty and filial devotion, has been immortalised by Sophocles in his noble tragedies, *Oedipus at Colonus* and *Antigone*. Æschylus's tragedy upon her story is lost, but she figures in his *Seven against Thebes*, and in the *Phonissæ* of Euripides.

Antigonus, surnamed the 'One-eyed' (*Cyclops*), one of the generals of Alexander the Great, received in the division of the empire, after the death of the latter, the provinces of Phrygia Major, Lycia, and Pamphylia. After the death of the regent Antipater in 319, he aspired to the sovereignty of Asia, and waged incessant wars against the other generals, making himself master of all Asia Minor and Syria. In 306 he assumed the title of king, but was defeated by Lysimachus, Cassander, and Seleucus in the decisive battle of Ipsus, in Phrygia, in which he was slain, 301 B.C. He was the father of Demetrius Poliorcetes. — **ANTIGONUS GONATAS**, son of Demetrius Poliorcetes, king of Macedonia, and grandson of the great Antigonus. He did not mount his throne until 276, about seven years after his father's death. Driven out of his kingdom in 273 by Pyrrhus of Epirus, he recovered it in the following year, and kept it until his death in 239.

Antigua, a West India island, the most important of the Leeward Islands, and the residence of the governor-in-chief of the British portion of the group. It is 28 miles long and 14 wide; in Boggies Hill attains a maximum altitude of 1328 feet; and has an area of 108 sq. m. Antigua was discovered in 1493 by Columbus, who is said to have named it after a church in Seville, called Santa Maria La Antigua. It was first settled by a few English in 1632, having till then remained, in fact, uninhabited on account of the great scarcity of fresh water. A number of colonists were sent here by Lord Willoughby, to whom Antigua was granted by Charles II. in 1663. For a time occupied by the French, it was declared a British possession by the Treaty of Breda (1667). The constitution consists of a governor, executive council, and a legislative council of twenty-four members, twelve of whom are elected. Antigua is the seat of an Anglican bishop. It has suffered severely from earthquakes in 1689, 1843, and 1874; while of hurricanes also, the other heavy scourge of the group, Antigua has had its full share. Numerous islets, rocks, and shoals border the shore, so that, generally speaking, access is difficult and dangerous. But St John, the chief town, stands at the head of a safe and capacious bay, which unfortunately, however, does not admit large vessels; and English Harbour is, on the whole, a more commodious port.

Antigua produces large quantities of sugar, molasses, rum, tamarinds, arrowroot, and cotton. The value of imports ranged during 1876 \$5. between £183,795 and £133,002; of exports, between £270,845 and £136,393. The revenue of Antigua, in 1884, was £41,937; the expenditure, £39,330. Pop. (1861) 36,412; (1881) 34,964, of

whom 1795 were whites. Pop. of St John, the capital, 18,700.

Anti-Lebanon (better Anti-Libanus), the eastern range of Lebanon (q.v.).

Antilegon'ena (Gr., 'spoken against'), a term applied to those books of the New Testament not at first accepted by the whole Christian Church, but ultimately admitted into the Canon the seven books of 2 Peter, James, Jude, Hebrews, 2 and 3 John, and the Apocalypse. The other books were called *homologoumena* (Gr., 'agreed to'). See BIBLE.

Antilles, a term applied to the whole of the West India Islands (q.v.) except the Bahamas. A hypothetical island, Antiglia, had figured in old sea-charts as early at least as 1424; and that name was applied in 1493 by Peter Martyr d'Anghiera to the West Indies. The Greater Antilles are Cuba, Jamaica, Hayti, and Porto Rico; the others are known as the Lesser Antilles.

Antimony—symb. Sb (Lat. *stibium*); equiv. 122—is a brittle metal of a flaky, crystalline texture, and a bluish-white colour. It is readily reduced to powder by ordinary pulverisation; when heated to 842° F. (450° C.), it fuses, and thereafter being allowed to cool, it solidifies in rhombohedral crystals, which are isomorphous with those of arsenic. Heated in a retort, where the oxygen of the air is excluded, as in an atmosphere of hydrogen, antimony volatilises as the vapour of the pure metal. When raised in temperature in contact with the air, it burns with a white light combining with the oxygen of the atmosphere, and forming copious white fumes of the sesquioxide of antimony, or 'flowers of antimony.' The metal is a bad conductor of heat and electricity, but may be used, in conjunction with bismuth, in the construction of thermo-electric piles. Exposed to the air at ordinary temperatures, antimony does not tarnish or rust; and this property, combined with the hardness of the metal and of its compounds, renders antimony of essential service in the useful arts, in the construction of alloys, such as Britannia metal, type metal, pewter, and white or anti-friction metal. Precipitated powder of antimony, called *antimony black*, is used for giving an iron-like appearance to casts.

Stibnite, or gray antimony ore, the impure sesquisulphide of antimony, Sb_2S_3 , is the principal source of the metal. This substance has long been employed in the East for darkening the eyebrows. Native antimony is found, but rather sparingly, associated with a few other metals. Antimony is smelted in France, where ore is found abundantly, in Germany, and in England, which receives its supply of ore from Singapore and Borneo. But stibnite has formerly been mined at several places in Great Britain. Although the extraction of antimony from its ore is a simple matter, there are several processes employed. Sometimes 'crude antimony,' or purified sulphide of antimony, is produced by lixiviation as a first stage in the operation. From this there are two or three ways of obtaining the impure metal, called 'regulus of antimony.' This raw antimony, whether obtained from the purified sulphide or direct from the ore, requires a calcination to separate such impurities as arsenic, iron, lead, copper, and sulphur. In the English process of getting it direct, the ore is smelted along with some alkaline slag and old scrap-iron in crucibles. When the mixture is completely fused, it is poured into conical moulds, and the contents of these, after cooling, consist of impure antimony and a slag of sulphide of iron. There are several methods in use for purifying the raw antimony (regulus). One of the simplest is to charge each of a number of crucibles with this regulus along with

some soda, common salt, and pure oxidised antimonial ore. When heat is applied, the foreign metals become oxidised and scorified, and nearly pure antimony or star metal is obtained.

The compounds of antimony are numerous: with oxygen it forms (1) the *sesquioxide* of antimony, or *white antimony ore*, Sb_2O_3 , which enters into the composition of tartar emetic; (2) *antimonious acid*, Sb_2O_3 , which forms one of the components of Dr James's powders; (3) *antimonic acid*, Sb_2O_5 , a very insoluble compound, obtained by acting upon the metal with concentrated nitric acid. With sulphur, antimony forms the *subsulphide*, Sb_2S_3 , already referred to as a natural ore of the metal, and which when roasted at a temperature sufficient to fuse it, passes into the mixed sesquioxide and subsulphide of antimony known commercially as the *glass of antimony*, used for colouring glass and porcelain yellow. A native oxysulphide, of a pretty red colour, is called *red antimony ore*. When the ordinary sulphide of antimony is boiled with potash, or the carbonate of potash, it dissolves; and thereafter, on boiling, deposits a reddish-brown substance, known as *mineral kermes*. The liquid from which the deposit has fallen, if treated with hydrochloric acid, throws down an orange precipitate of *golden sulphide* of antimony.

There is also a chloride of antimony, SbCl_3 , prepared by heating sulphide of antimony and hydrochloric acid together, and which has the common name of *butter of antimony*. It is generally obtained as an oily liquid, of the consistence of melted butter, and of a golden-yellow colour. Mixed with olive oil, it is used by ginnakers as *bronzing salt*, to impart a yellow colour to gun-barrels.

Various compounds of antimony are used as medicinal agents, both in human and veterinary practice, especially the *tartar emetic*, a double tartrate of antimony and potash, $(\text{KSBOT})_2\text{H}_2\text{O}$, which is the active ingredient in antimonial wine, sherry constituting the bulk of the compound. Several cases have occurred where tartar emetic has been used criminally as a poison.

Basil Valentine, in his *Triumphal Chariot of Antimony*, says, 'the shortness of life makes it impossible for one man thoroughly to learn antimony, in which every day something of new is discovered.'

Antino'mianism (Gr. *anti*, 'against,' and *nomos*, 'law'), the doctrine or opinion that Christians are freed from obligation to keep the law of God. It is generally regarded by advocates of the doctrine of justification by faith, as a monstrous abuse and perversion of that doctrine, upon which it usually professes to be based. From several passages of the New Testament, as Rom. vi. and 2 Pet. ii. 18, 19, it would seem that a tendency to antinomianism had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the middle ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by John Agricola (q.v.). Agricola had adopted the principles of the Reformation; but in 1527 he found fault with Melancthon for recommending the use of the law, and particularly of the ten commandments, in order to produce conviction and repentance, which he deemed inconsistent with the gospel. Ten years after, he maintained in a disputation at Wittenberg, that as men are justified simply by the gospel, the law is in no way necessary for justification or for sanctification. The 'Antinomian Controversy' of this time, in which Luther took a very active part, terminated in 1540 in a retraction by Agricola; but views more extreme than his were afterwards advocated by some of the English sectaries of the period of

the Commonwealth; and without being formally professed by a distinct sect, antinomianism has been from time to time reproduced with various modifications. It ought, however, to be borne in mind that the term has no reference to the *conduct*, but only to the *opinions* of men; so that men who practically disregard and violate the known law of God, are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian, have in many cases been men of moral life. It is also to be observed that the term has been applied to opinions differing very much from each other. In its most extreme sense, it denotes the rejection of the moral law as no longer binding upon Christians; and a power or privilege is asserted for the saints to do what they please without prejudice to their sanctity; it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty. But besides this extreme antinomianism, than which nothing can be more repugnant to Christianity, there is also sometimes designated by this term the opinion of those who refuse to seek or to see in the Bible any positive laws binding upon Christians, and regard them as left to the guidance of gospel principles and the constraint of Christian love. Antinomianism usually originates in mistaken notions of Christian liberty, or in confusion of views as to the relation between the moral law and the Jewish law of ceremonial ordinances.

Antin'ous, a youth of extraordinary beauty, a native of Claudiopolis, in Bithynia, the favourite of the Emperor Hadrian, and his companion in all his journeys. He was drowned in the river Nile, near Besa, in 122 A.D., perhaps through suicide, either from weariness of the life he led, or from a superstitious belief that his voluntary death would avert disaster from the emperor. The emperor's grief knew no bounds—he enrolled him among the gods; built in his honour Antinoëpolis on the ruins of Besa, as well as numerous temples in Bithynia, Arcadia, and elsewhere. Antinous became, on Hadrian's account, a favourite subject for art, and many statues, busts, gems, and medals exist, representing him as the ideal of youthful manly beauty, often also with the added attributes of deity. Some of these rank among the masterpieces of Roman art, especially the colossal statue in the Vatican representing the youth as Dionysus, with ivy crown and hanging locks; the statue in the Capitoline Museum; and the marble bust in relief in the Villa Albani. Antinous's relations with Hadrian form the subject of the well-known romances, *Antinous*, by George Taylor, and *Der Kaiser*, by Elber. See Dietrichson's *Antinous* (Christiania, 1886).

Ant'ioch, the ancient capital of the Greek kings of Syria, and long the chief city in Asia, lies in a fertile and beautiful plain, on the left bank of the river Orontes, 14 miles from the sea. In ancient times by its navigable river and its harbour, Seleucia, it had communication with all the maritime cities of the West; while it became on the other hand an emporium for the merchandise of the East, for behind it lay the vast Syrian desert, across which travelled the caravans from Mesopotamia and Arabia. Thus through it passed the high-road between Europe and Asia. It received from Strabo the name of *Tetrapolis* ('four cities'), on account of three new sites having been built upon successively, and each surrounded with a wall. The city was erected by Seleucus Nicator about 300 B.C., and was the most splendid of the sixteen cities built by him in honour of his father Antiochus. In early times a part stood upon an island which has now disappeared. The rest was built partly on the

plain, and partly on the rugged ascent towards Mount Casius (*Jebel Okrah*), amid vineyards and fruit-trees. The ancients called it 'Antioch the Beautiful,' and 'the Crown of the East.' It was a favourite residence of the Seleucid princes, and of the wealthy Romans, and was famed throughout the world for its splendid luxury. Its public edifices were magnificent. The city reached its greatest glory in the time of Antiochus the Great, and under the Roman emperors of the first three centuries. At that time it contained 500,000 inhabitants, and vied in splendour with Rome itself. Nor did its glory fade immediately after the founding of Constantinople; for though it then ceased to be the first city of the East, it rose into new dignity as a Christian city. It was one of the earliest strongholds of the new faith—indeed, it was here that the name of *Christians* was first used. During the apostolic age it was the centre of missionary enterprise, and it became the seat of one of the four patriarchs. Ten councils were held here from 232 to 380. Churches sprang up exhibiting a new style of architecture which soon became prevalent; and even Constantine himself spent a considerable time here, adorning it, and strengthening its harbour, Seleucia. The downfall of the city dates from the 5th century. In 538 it was reduced to ashes by the Persian king Chosroes, but it was partly rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the 7th century. In the 9th century it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The Crusaders besieged and took it in 1098. At the close of the 13th century, the sultan of Egypt seized it. At present it forms a portion of Syria, in the province of Aleppo, and has a population of 17,500, mostly Turks employed in silk-culture, eel-fishing, and in the production of corn and oil. Its modern name is *Antakieh*. It exhibits almost no traces of its former grandeur, except the ruins of the walls built by Justinian, and of the fortress erected by the Crusaders. It suffered from an earthquake in 1872. ANTIOCH, in Pisidia, founded also by Nicator, was declared a free city by the Romans in the 2d century B.C., and made a *colonia* under Augustus, with the name *Cæsarea*. It was often visited by St. Paul.

Antiochus, the name of thirteen kings of Syria of the Seleucid dynasty. ANTIOCHUS I., surnamed Soter (reigned 281-261 B.C.), the first of the Syrian dynasty of the Seleucidae, was the son of Seleucus, one of the generals and successors of Alexander. The murder of his father in 281 gave him the whole Syrian empire, but left him too weak to assert his right to Macedonia. Antiochus gained the name of Soter ('Saviour') for a victory over the Gauls, but fell in a subsequent battle with them in 261. —ANTIOCHUS II. (261-246), surnamed Theos ('God') by the Milesians, whom he freed from their tyrant Timarchus. On the death of Ptolemy, whose daughter Berenice he had been compelled to marry, Antiochus recalled his former wife Laodice; but she, in revenge for the insult which she had received, caused Antiochus to be murdered, along with Berenice and her son. Antioch lost the provinces of Parthia and Bactria. —ANTIOCHUS III., surnamed the Great, the son and successor of Seleucus Callinicus, and grandson of the preceding, was the most distinguished of the Seleucidae. He reigned from 223 to 187. He failed in his attempts to recover Parthia and Bactria, and waged war with success against Ptolemy Philopater, and though defeated in a great battle fought at Raphia near Gaza (217), he afterwards obtained entire possession of Palestine and Coele-Syria (198). In

this war he was assisted by the Jews, to whom he granted many privileges. Fearing the power of the Romans, Antiochus at length concluded a peace with Egypt, betrothed his daughter Cleopatra to the young king Ptolemy, and gave her Coele-Syria and Palestine as a dowry. He afterwards became involved in war with the Romans, who had conquered Macedonia; but he declined to invade Italy at the instigation of Hannibal, who had come to his court for refuge. He crossed over into Greece, but was defeated in 191 at Thermopylae, and in 190 by Scipio at Magnesia. Peace was granted him only on condition of his yielding all his dominions east of Mount Taurus, and paying a heavy tribute. In order to raise the money, he attacked a wealthy temple in Elymais, when the people rose against him, and killed him (187 B.C.). ANTIOCHUS IV. (175-164 B.C.), surnamed Epiphanes, fought against Egypt and conquered great part of it. He twice took Jerusalem; and, endeavouring there to establish the worship of Greek gods, he by his tyranny and sacrilege excited the Jews to a successful insurrection under their leaders Mattathias and his heroic sons, the Maccabees. —The last of the Seleucidae, ANTIOCHUS XIII., surnamed Asiaticus, was deprived of his kingdom by Pompey, who reduced Syria to a Roman province (65 B.C.).

Antipadobaptist is a term derived from Greek words for one who objects to infant baptism. See BAPTISTS.

Antiparos (anc. *Oliaros*), one of the middle Cyclades in the Egean Sea, close to Paros. It is well cultivated and tolerably fertile, nearly 14 sq. m. in area, and contains about 500 inhabitants. Rich lead mines were discovered in 1872. Its wonderful stalactite grotto is not alluded to by any Greek or Roman writer, but has been well known since 1673. The entrance forms a wide natural portico on the south-west side of a mountain, from which the visitor reaches the first spacious vault by means of ropes and ladders. To go further is still more difficult. At a depth of 918 feet under the entrance, the chief chamber is reached. It is 312 feet long, 98 wide, and 82 high, and is covered everywhere with the most wonderful stalactite and stalagmite formations.

Antipater. (1) a general highly trusted by Philip and Alexander the Great, left by the latter as regent in Macedonia when he crossed over into Asia, 334 B.C. He discharged duties of this office with great ability, suppressing the insurrections in Thrace and Sparta; but he was about to be superseded by Craterus, through the influence of Olympias, when Alexander died. The government of Macedonia was assigned to him anew, in conjunction with Craterus; and soon after, he was called upon to defend himself against an alliance of the Grecian states. The war, usually called the Lamian war from Lania where Antipater was besieged in 323, was terminated by the defeat of the confederates in 322. The murder of his unsuccessful rival, Perdiccas, in Egypt in 321 B.C., left Antipater the supreme regency of the kingdom, and the guardianship of Alexander's children. He died at an advanced age in 319. —(2) The father of Herod the Great, appointed by Julius Cæsar procurator of Judæa in 47 B.C. He was poisoned in 43 B.C. —(3) The son of Herod the Great by his first wife, a worthless prince, who was perpetually conspiring against the life of his brothers, but was executed in prison five days before Herod died.

Antipathy is the term applied to a class of cases in which individuals are disagreeably affected by, or violently dislike, things innocuous or agreeable to the majority of mankind. These peculiarities are sometimes innate. James I.'s, for instance,

to a drawn sword; sometimes they are due to a child's having been injudiciously terrified with some object, the mental impression becoming permanent. In many cases, antipathy arises from mental association, often unconscious, of one object or impression with some other admittedly unpleasant, or with some painful experience in the past life of the person affected. A large class of persons have an antipathy to animal food, and from childhood refuse to taste it. In others, again, the aversion is limited to one kind of meat, as veal or pork; others are averse to eggs or milk. Nor is this feeling a conscious caprice, which an exertion of the will might remove; for it is generally found that contact with the object of the antipathy is resented by the bodily economy, and symptoms of poisoning are rapidly produced. Some are affected with these symptoms who have no mental aversion to the article. Some medicines affect particular persons dangerously, even when given in very minute doses; on others, medicines have a peculiar effect—astringents may purge. The air of some places has a peculiar influence on individuals.

The most remarkable antipathies are those affecting the special senses. Nearly all persons have a loathing at reptiles, but some few faint on seeing a toad or lizard, others on seeing insects. Tychō Brabé fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at a pig. Hearing a wet finger drawn on glass, the grinding of knives, or a creaking wheel, is sufficient to produce fainting in some. Smelling musk or ambergris throws some into convulsions; and we have seen how articles of food affect others—often, no doubt, owing to perverted taste. The touch of anything unusually smooth has the same effect sometimes. Zimmerman records the case of a lady who was thus affected by the feeling of silk, satin, or the velvety skin of a peach. This subject is also noticed under IDIOSYNCRASY.

Antiperiodics are drugs which relieve or cure certain diseases (particularly ague, and some forms of neuralgia and headache) whose attacks occur at regular intervals. The most important are cinchona bark and its alkaloids, especially quinine, and aniseic.

Antiphlogistic (Gr. *anti*, 'against,' and *phlogiston*, 'burn'), a term applied to remedies and to regimen opposed to inflammation, such as blood-letting, purgatives, low diet, &c.

Antiphon, the earliest of the ten Attic orators in the Alexandrine canon, born at Rhegium in Attica, 480 B.C. He belonged to the oligarchical party at Athens, and to him, according to his pupil Thucydides, was mainly due the establishment of the government of the Four Hundred in 411 B.C. On its fall, six months later, Antiphon was brought to trial and condemned to death, in spite of his noble defence. Only fifteen of his orations have come down to us, of which three were written for others, while the remainder appear to have been intended as specimens of school-rhetoric for his pupils. The best edition is by Blass (Leip. 1881).

Antiphony, the name of a species of sacred song, sung by two parties, each responding to the other. Many of the Psalms show that antiphonal singing was in use in David's time. Its introduction into the Greek Church is ascribed to Ignatius, Bishop of Antioch, in the 2d century; and Ambrosius, Bishop of Milan, is said to have introduced it into the Western Church, in the 4th century. The chanting of the Psalms in the English cathedral service is an imitation of the ancient antiphony.

Antipodes, a word of Greek origin, signifying, literally, those who have their feet over against

each other. Thus Trevisa, in 1398, says that 'in Ethiopia are the Antipodes, men that have their feet against our feet.' As applied in geography, the term means the inhabitants of any two opposite points of the globe, or, in other words, the dwellers at the opposite extremities of any diameter of the earth. From this primary relation there necessarily arise many secondary relations. Antipodes must be on one and the same meridional circle, separated from each other by half the circumference. Being on one and the same meridional circle, they must differ in longitude exactly 180°, with the exception of the poles themselves, as having no longitude at all; and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take, as an example, London, in 51° 30' N. lat., and 0° 5' W. long. Its antipodes must be in 51° 30' S. lat., and in 180° 5' W. long., or rather 179° 55' E.—coinciding pretty nearly with Antipodes Island (49° 48' S.; 178° 20' E.), an uninhabited rocky islet, about 5 miles long, with smaller rocks around it, lying to the south east of New Zealand.

Between antipodes in general there necessarily exist also other secondary relations. With reference to the earth's daily rotation, the noon of the one side must be the midnight of the other; while, with regard to its annual revolution, the summer and the autumn of the one side must be the winter and the spring of the other. The midnight corresponds to the noon on the other side, either of the day before or the day after, according as one has reached the antipodes sailing from the east or from the west. In going eastward—that is, in meeting the sun—one, from day to day, anticipates every noon and every midnight in the proportion of 4' of time to 1' of long., or of 12 hours of time to 180° of long. In going westward, again, one postpones every noon and every midnight in the same proportion.

Antipope, a pontiff elected in opposition to one canonically chosen. The first antipopes were Felix, during the pontificate of Liberius (352-366); Ursinus, against Damasus (366-384); and Laurentius, against Symmachus (498-514). During the middle ages several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otto the Great displaced successively two Bishops of Rome; and when the rival pope, Sylvester III., had expelled the simoniacal and profligate Benedict IX. (1033-45), the latter was brought back by the German King, and soon afterwards sold his dignity to Gregory VI. There were now, consequently, three popes, but their claims were all set aside at a council convened at Sutri by the emperor, Henry III., and a new pope elected as Clement II. in 1046. Shortly after, Pope Alexander II. found a rival in Honorius II., the nominee of the emperor; but his claim was ratified by a council convened at Mantua. In 1080 the same unseemly spectacle was witnessed, when the emperor, Henry IV., elevated to the papal chair Guibert of Ravenna, under the title of Clement III., in opposition to his own implacable adversary, Gregory VII. But after the death of Gregory (1085), Clement was himself opposed successively by Victor III. (1086-88) and Urban II. (1088-99). Innocent II. (1130-43) triumphed over the antipope Anacletus II. by the help of St Bernard; and Alexander III., during his pontificate (1159-81) had to contend with no fewer than four successive antipopes, the election of only one of whom, however, Victor V., in 1159, has any canonical validity. After a long contest, Clement V. was elected in 1305, and four years later he transferred his seat to Avignon, where his successors reigned for nearly seventy years, losing the while,

by their subjection to French influences; the sympathies of Germany and England. The election of Urban VI. in 1378 occasioned 'the great schism of the West,' which divided the church for fifty years. He was elected by the Romans, who demanded an Italian pope after the death of Gregory XI. The French cardinals, then a majority in the curia, on the plea that they had elected the pope only under intimidation, withdrew to Provence, and elected a new pope under the name of Clement VII., who was recognised by France, Spain, Savoy, and Scotland; whilst Italy, Germany, England, and the whole north of Europe, supported Urban VI. For thirty-eight years Christian Europe was scandalised by the spectacle of two popes, one at Geneva, another at Rome, in turn hurling the most awful anathemas of the church at each other, like 'two dogs snarling over a bone,' in Wyclif's phrase. At the beginning of the 15th century, an attempt was made to prevail on both the rivals, Gregory XII. at Rome, and Benedict XIII. at Avignon, to renounce their claims with a view to promote union, but both evaded this as long as possible. At length, however, the cardinals attached to either court agreed to summon a general council, which met accordingly at Pisa in 1409. The council deposed both popes, and constituted the separate bodies of cardinals into one conclave, which elected Alexander V. to the papal chair. The council of Basel (1431-47), in its struggle with Pope Eugenius IV. (1431-47) for supremacy, attempted to arrogate to itself the papal functions, and proceeded to elect Amadeus of Savoy pope, as Felix V. The attempt, however, failed; the popes Eugenius IV. and Nicholas V. (1447-55) secured their authority, the ambitious council finally dissolved itself, and Felix V. resigned his empty dignity, and was raised to the rank of cardinal by the magnanimous pope himself. This was the last occasion on which the faithful were distracted by the sight of a rival pontiff within Christendom. See POPE.

Antipyrin is one of the most serious rivals to quinine yet artificially produced. It is obtained from coal-tar products by a process of great complexity, its chemical composition being $C_{11}H_{12}N_2O$. It is a white crystalline powder, tasteless, colourless, and soluble in water. Given in doses of 15 to 30 grains, it reduces the temperature 2° to 3° in about an hour, without the discomfort of profuse perspiration, and is therefore of great value as a febrifuge. It is not an antiperiodic, however, and therefore cannot replace quinine in cases of ague or intermittent fevers.

Antiquaries. SOCIETY OF. See ARCHEOLOGY, ACADEMY.

Antique. As the term ancients is commonly applied to the Greeks and Romans, the word antique is used with reference to their works of art, especially their incomparable sculptures. See SCULPTURE.

Antiquities. See ARCHEOLOGY.

Anti-rentism, a term applied to the action of a political party which caused considerable disturbance in the state of New York (1843-47) in connection with the non-payment of rent. Large tracts of land had been granted in old colonial days by the Dutch West India Company to its members in New York, who had the title or 'living' of a lord 'patroon' or protector, and the colony or manor was governed by feudal tenures. Though the latter were abolished by laws enacted in 1779 and 1785, yet the proprietors managed to turn a deed by which rents and dues should be paid as formerly. Associations were formed in 1839 to get rid of these burdens; evictions were tried by the proprietors, which led to resistance and outrages. Ultimately the legislature gave relief of a certain

kind to the tenantry, feudal tenures and incidents were abolished, and agricultural land was forbidden to be leased for a longer period than twelve years.

Antirrhinum. See SNAPDRAGON.

Antisana, a volcano of the Andes, in Ecuador, about 35 miles SE. of the town of Quito, 19,260 feet high. On its slopes are many extinct craters, and at a height of 12,400 feet, the famous Tambo de Antisana, one of the highest inhabited places in the world.

Antiscorbutics. See SCURVY.

Antisemites, the modern opponents of the Jews in Russia, Roumania, Hungary, and Eastern Germany. In these countries the Jews are found in great numbers, and their constantly increasing wealth and influence excite popular jealousy and alarm. The question how far it is advantageous for a country to allow excessive wealth and political power to pass into the hands of a race avowedly alien, and but little influenced by the sentiment of nationality, admits of discussion, but there can be no excuse for the brutal outrages upon innocent individuals that occurred in Russia and Hungary in the years 1881-84. Even in the enlightened capital of the German empire the *Judenhetze* raged hotly; and an Anti-Semitic League was formed in 1881 to restrict the liberty of Jews in Germany. The emperor interfered to stop the cowardly persecution, but not before thousands of Jews had left the country. The persecution in Russia assumed a more brutal character than in Germany, and thousands of Jews fled to America, Spain, and elsewhere to save not alone their liberties and their property, but their lives. In Hungary violent anti-Jewish riots occurred at Pesth, Zala, and elsewhere, which were not brought to an end until martial law was proclaimed. See JEWS.

Antiseptics (Gr. *anti*, 'against,' *septikos*, 'causing putrefaction') are substances which prevent or arrest putrefaction and analogous fermentative changes. It has been proved that Putrefaction (q.v.), fermentation of grape-juice (*vinous fermentation*), of milk (*lactic fermentation*), and many, though probably not all other fermentations, depend upon the presence of microscopic vegetable organisms (see GERM THEORY). To prevent these processes, then, it is necessary either (1) to exclude these organisms altogether; (2) to interfere with conditions which permit of their development; or (3) to destroy their vitality.

(1) These organisms, or their germs, are present in ordinary air; but it has been shown by Pasteur, Tyndall, Lister, Roberts, and others, that if air be filtered through cotton wool, or (if moving slowly) through a fine bent tube, it may be allowed to come in contact with putrescible substances, if these themselves contain no living organisms or germs, without causing putrefaction. This method, however, has had no important applications except in scientific research.

(2) Their growth may be arrested (*a*) by a low temperature. Thus large quantities of fresh meat are imported from America, and even Australia and New Zealand, in chambers cooled to near the freezing point. Carcasses of the long-extinct mammoth, with the flesh still present, have been found in the ice-cells of Siberia. The longer time that meat, milk, &c. keep in cold than in hot weather is familiar. (*b*) By absence of moisture. Thus, if the contents of an egg be thrown out on a plate, and thoroughly dried in an oven, the whole becomes of a hard, horny consistence, and may be kept in this state for years. If soaked in water, it will soon begin to putrefy. In the same way meat may be kept fresh by thoroughly drying it. (The preservation of fruits, &c. in strong syrup is an example of a somewhat similar action.)

(3) The vitality of these organisms may be destroyed (*a*) by heat—e.g. meat and other eatables can be preserved for an indefinite time if they are boiled and hermetically sealed, while still hot, in tin vessels (see PRESERVES); (*b*) by various chemical substances. Some of the most important are common salt and salt-petre, used in curing fish, pickling meat, &c.; alcohol, in preserving zoological specimens, vegetable essences, fruits, &c.; sulphurous acid, boracic acid, and arsenious acid; many salts, as chloride of zinc (Burnett's solution, *q.v.*), permanganate of potash (Condy's fluid, see under MANGANESE), sulphate of copper (blue vitriol), corrosive sublimate, nitrate of silver; chlorine (given off by chloride of lime), iodine, iodoform (CHI_3), glycerine, boroglyceride, eucalyptus oil, thymol, creasote, carbolic acid, salicylic acid, tannic acid, quinine, the patent preparation 'sanitas,' charcoal (both vegetable and animal), dry mould, used in the earth-closet system (see SEWAGE). All these substances act directly or indirectly as poisons to the organisms which produce putrefaction, &c.; most of them are either poisonous or very unpalatable to man, and cannot therefore be used in preserving food. Many of them are, however, used in the arts to arrest the decomposition of putrescible substances—e.g. in the manufacture of size for writing-paper from scraps of hides, sulphite of soda, containing sulphurous acid, is added; hides are preserved by salt, or, when tanned, by tannin, a compound of tannic acid; and timber is found less liable to decay if charged with an anti-septic, such as sulphate of copper, chloride of zinc, corrosive sublimate, or creasote. The timber is placed in a steam-box, so that the air contained in its pores is displaced by steam; the whole casing is then closed tight, and allowed to cool; the steam condenses and leaves a vacuum in and around the wood. If one of these substances is then introduced, it finds its way into the innermost pores of the timber (see WOOD-PRESERVING).

Several of the above-named antiseptics are largely used in the preservation of food. Salicylic acid is used for preserving beer, butter, fruits, and meat; and to such an extent is this the case, that the French authorities have forbidden the sale of anything containing this preservative, on the ground that when taken continuously, even in small doses, it is injurious to health. The opposite view is held by many in this country, and the question is still *sub judice*. Boracic acid, either alone or mixed with borax or glycerine, is a very powerful preservative, and experience indicates that the amount necessary to preserve food is perfectly harmless. Large quantities of butter (Swedish, &c.) are now sent into this country, which have only sufficient salt added to impart flavour, and which owe their keeping properties to boracic acid. It is also coming into use for preserving fresh fish, and a bright future is opening up to fishermen in secluded waters, who hope thereby to be able to get a wider market for their harvest. Milk and meat are readily kept sweet for some time when treated with this acid.

Next to the preservation of food, the most important purposes for which antiseptic methods and substances are used, are the *prevention of infectious diseases*, and the *treatment of wounds*. The properties of the infectious matter of infectious diseases are closely analogous to those of the organisms that lead to putrefaction, &c.; and even in cases where its organic nature has not been proved (see GERM THEORY), it can be rendered inert by a proper use of antiseptics, or by exposure to a high temperature. Thus, anything that has come near the patient suffering from an infectious disease, and discharges from his person, are made harmless by carbolic acid, chloride of zinc, or

some other antiseptic; his bedding is roasted in an oven at a temperature of 212°F. (100°C.), or more; the room where he has been treated is fumigated with chlorine or sulphurous acid; and so the disease is prevented from spreading. This is, in fact, one of the chief aims of medical practice at the present day (see DISINFECTANTS).

Many of the evil effects which follow wounds and surgical operations are due to the presence of organisms (see PYÆMIA); and the effects of their antiseptic treatment, introduced by Sir Joseph Lister, have been marvellous.

Antiseptic Surgery, or LISTERISM, is the system of treating surgical wounds introduced by Sir Joseph Lister (*q.v.*), based on his clear recognition of the fact that putrefactive processes (*sepsis*) are the chief danger which the surgeon has to combat in dealing with accidental and operation wounds. The system consists essentially in excluding, by the use of germicide substances, those microbes by which fermentative processes are induced, or in eradicating them from wounds to which they have gained access. In this way pyæmia, septicæmia, erysipelas, and gangrene, once the scourge of surgical hospitals, have in a short period of years become diseases of rare occurrence, and the reduction in hospital mortality has been very great. Carbolic acid dissolved in various menstrua, in the form of a steam spray, or impregnated in gauze or cotton-wool, was till recently the favourite antiseptic in surgical practice. Thymol, eucalyptus oil, boric and salicylic acids, and iodoform, are also in frequent use for the same purposes. In 1881 Professor Koch of Berlin drew attention to the much greater potency of perchloride of mercury (corrosive sublimate) as compared with other antiseptics, and his suggestion of its employment in a one *pro mille* aqueous solution has now been universally adopted with satisfactory results. Along with carbolic acid, which is still preferred for some parts of the method, this antiseptic is employed in destroying the infective particles or *germs* in the immediate neighbourhood of the wound. The wound itself is only treated with the germicide solution when the presence of germs within it is suspected, otherwise it is kept free from the irritative action of the lotion; but all objects approaching it must be rigorously purified if the danger of infection is to be safely avoided.

Method of Operating and of Dressing Operation-wounds. The skin of the part, the hands of the operator and his assistants, and the instruments, are carefully purified with a watery solution (1 in 1000) of corrosive sublimate. Sponges, ligatures, and Drainage-tubes (*q.v.*) are kept in carbolic acid solutions. The operation is conducted in an atmosphere impregnated with carbolic acid by means of a fine spray, usually produced by steam generated in a small boiler, or the wound and its neighbourhood are constantly irrigated by the corrosive sublimate solution during the continuance of the operation. When the operation is completed and the wound closed, it is covered with a layer of specially prepared oil-silk (protective), to prevent constant irritation by the antiseptic in the dressing. This consists of muslin impregnated with a mixture of carbolic acid, resin, and paraffin; it retains the carbolic acid at ordinary temperatures, but gives it off slowly at the temperature of the body, so that the dressing remains in an actively antiseptic condition for some days, till all its carbolic acid has evaporated. The first layer is wetted in carbolic acid solution (1 to 40) to destroy any germs adhering to its surface, and render it actively antiseptic at once. The remainder is applied dry, in order to soak up the discharge as it flows from the wound. This dressing may be in part or wholly replaced by fine cotton wadding impregnated with corrosive

sublimate, or with salicylic acid, its elasticity rendering it a more comfortable application, and permitting its close adaptation to the contour of the body. The whole is fixed by bandages. The dressing is in general not changed till discharge becomes visible through it. When it is changed, similar precautions with regard to spray, purification of hands, &c. must be observed.

Treatment of Wounds not inflicted by the Surgeon.—They are washed out with a searching antiseptic solution, as watery solution of corrosive sublimate (1 in 500) or carbolic acid (1 in 20), and are thus at once thoroughly disinfected. They are then treated like operation-wounds. After 48 hours at furthest, it is not generally possible to eradicate the causes of putrefaction thoroughly.

Results.—If this treatment is thoroughly carried out: (1) no bacteria and no putrid smell are present in the discharge; (2) no pyæmia, septicæmia, hospital gangrene, or erysipelas results; and in general (3) no formation of pus takes place; (4) no pain is felt in the wound; (5) no fever follows.

Some of the most striking effects of this method on surgical practice are: (1) In many cases of injury, especially compound fractures and dislocations, a limb may now be preserved where amputation was formerly considered necessary. (2) Many operations are now fearlessly and safely performed, which formerly were either not attempted, or were frequently followed by disastrous results; especially operations on bones and joints, and opening of Chronic Abscesses, and Serous Membranes (q.v.). (3) Mortality from injuries and operations has been greatly diminished—e.g. the death-rate after major amputations (in 1864 and 1866) fell from 45 per cent. to 15 per cent. (1867-69) in Lister's wards in Glasgow after he introduced his method, and to about 12 per cent. (in 1871-77) in Edinburgh, when he had further developed it. Volkman of Halle was on the point of closing his wards in consequence of the prevalence of pyæmia and septicæmia. He tried Lister's method, and during the next five years the total mortality in his ward was less than 6 per cent. See Cheyne's *Antiseptic Surgery* (1882).

Antispasmodics. See SPASM.

Antisthenes, founder of the Cynic school of philosophy, was the son of an Athenian father and a Thracian mother. He fought in his youth at Tanagra (426 B.C.), was first a disciple of Gorgias, afterwards a friend and follower of Socrates, and died at Athens at the age of 70. After the death of Socrates, he taught moral and practical philosophy in the Athenian gymnasium Cynosarges, from which it is said his school derived its title. Antisthenes held that virtue mainly consists in voluntary abstinence from pleasure, and in a stern contempt of riches, honours, and even learning. He showed his contempt for all the luxuries and comforts of life by eating the hardest fare and wearing ragged garments—an eccentricity which Socrates reproved with the words, 'I see your pride through the holes in your cloak.' Antisthenes attracted many imitators, among them the famous Diogenes, and from his school the Stoics subsequently sprung. His writings have mostly perished.

Antithermin is the popular name applied to a substance derived from coal-tar, and having a very complex chemical composition, introduced by M. Nicot in 1887 as a rival to quinine. As its name indicates, it acts by reducing temperature, and therefore combating inflammation.

Antithesis (Gr. *anti*, 'against,' and *thesis*, from *tithesthai*, 'I place'), an opposition or contrast of ideas expressed by bringing words that are the natural opposites of each other close together so as to produce a strong contrast. Thus

Lessing, in a criticism on a book, says: 'It contains many good things and many new; but the good are not new, and the new are not good.' Antithesis, when naturally and moderately employed, gives liveliness to style; but, like all strong figures of speech, becomes wearisome when too often repeated, as it is in the somnolent prose of Dr Johnson.

Antitrinitarian, one who denies the doctrine of the Trinity. The name is practically synonymous with Unitarian. See UNITARIANS and TRINITY.

Antitype, a Greek word, literally signifying a type or figure which corresponds to some other type or figure. In its theological sense, it denotes, not a type, but the person in whom any prophetic type is fulfilled; thus, Christ is called the antitype of the paschal lamb. See TYPE.

Antium, one of the most ancient cities of Latium, built on a rocky promontory running out into the sea. Being favourably situated for commerce and piracy, it became, under the Volseians, one of the most powerful enemies of rising Rome. Conquered in 468 B.C., it soon revolted, and long maintained its independence, but was at length subdued in 338 B.C. It was deprived of all its ships, the beaks of which (*rostra*) were carried off to ornament the platform of the speakers in the Roman forum. It became a favourite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces; such as the Apollo Belvedere, and the Borghese Gladiator. It was the birthplace of the Emperors Caligula and Nero.

Antivari, a seaport on the coast-district assigned to Montenegro by the Treaty of Berlin in 1878. It was formerly Albanian, and is 18 miles N.W. of Scutari. It has a citadel, and a small harbour, shut against war-ships. Considerable trade is carried on in manufactured goods, tanned hides, soap, and petroleum. Pop. 8000.

Antlers, bony outgrowths from the frontal bones of almost all the members of the deer family. Except in the reindeer, they are restricted to the males, and are secondary sexual characters used as weapons in fighting for possession of the females. They appear as a pair of knobs covered with dark skin, from which the bony tissue is developed. In the year after that of birth, the antlers remain unbranched conical 'beams.' In the following spring, the previous growth having been meanwhile shed, the antlers grow to a larger size, and form their first branch or 'brow.' Year by year the number of branches or 'tines' increases, and more than sixty have been counted on some magnificent heads. The soft hairy skin which secures their rapid annual growth is known as the 'velvet,' and its accidental injury affects the development of the antlers. Growth ceases when the blood-supply is cut off by the development of a tubercled burr at the base, and the deer then rub off the dry skin and leave the bone bare. The antlers are shed, in many cases at least, annually, after the breeding period. The various types of antlers are used as convenient characters in distinguishing the different genera. Investigation of fossil forms has shown that the gradual development of antlers exhibited in the individual life of the deer is a recapitulation of their progressive historic evolution. See HORNS, DEER, SEXUAL SELECTION.

Ant-lion, the larva of an insect (*Myrmaleon*) of the order Neuroptera, remarkable for the ingenuity of its insect-catching habits. It inhabits sandy districts, is not known in Britain, and is

more common in the south of Europe than in the north. Some species are common in North America. The perfect insect is about an inch long, and has a general resemblance to a dragon-fly. The grayish-yellow larva is rather more than half an inch long; it has a stout hairy abdomen, and a small head, which is furnished, however, with two very large incurved mandibles. It has six legs, but is incapable of rapid locomotion, and generally jerks itself backwards. It feeds upon the juices of insects, especially ants, in order to obtain which it cleverly excavates a funnel-shaped pitfall in sandy ground, and lies in wait at the bottom, often with all but its mandibles buried in the sand. When insects approach too near to the edge of the hole, the loose sand gives way, so that they fall down the steep slope. If they do not fall quite to the bottom, but begin to scramble up again, the ant-lion throws sand upon them by jerking its head,



Ant-lion, showing perfect insect, larva, and excavation

and thus brings them back. It employs its head in the same way to eject their bodies from its pit, after their juices have been sucked, and casts them to a considerable distance; and by the same means throws away the sand in excavating its hole, first plunging it up with its body, and then placing it upon its head by means of one of its fore legs. It always begins by working round the circumference of its future hole, and gradually narrows and deepens it; turning quite round after each time that it works round the hole, so as to employ next time the fore leg of the other side. When it meets with a stone which it cannot remove, it deserts the excavation and begins another. The pit is rather more than two inches deep. After about two years the larva spins its cocoon. The habit is seen at a lower stage of evolution in some species which simply bury themselves in the sand without making any pitfall. The name of Ant-lion (*Myrmecoleon*) was long given to a fabulous beast, supposed to be the offspring of a lion and a female ant, and participating in the form and qualities of both parents.

Antofagasta, a port in the Chilean territory of the same name, of increasing importance. Founded in 1870, the town owes its rapid rise to the saltpetre deposits in the neighbourhood, and to the rich mines of Caracoles, with which it is connected by railway. It was taken from Bolivia by Chili in the war of 1879. Pop. (1875) 538. See ATACAMA.

Antommarchi, FRANCESCO, the physician of Napoleon at St Helena, was also a native of Corsica, and was born about 1780. He was already an anatomist of some celebrity at Florence, when he was induced in 1818 to go to St Helena. Napoleon received him with mistrust, but ultimately

gave him his full confidence, and at his death left him 100,000 francs. After his return to Europe, he published at Paris his famous but scarcely trustworthy book, *Les Derniers Moments de Napoléon* (1823). During the Polish revolution, he did duty at Warsaw as director of military hospitals. He afterwards went to the West Indies, and died in Cuba, on the 3d of April 1838.

Antonelli, GIACOMO, cardinal, was born 2d April 1806, at Sonnino, a village situated near the Pontine Marshes. His father was a woodcutter, member of an ancient but decayed family. In 1819 his birthplace having been demolished as a nest of robbers, Antonelli came to Rome, and entered the Grand Seminary, where he proved himself one of the cleverest students of his time. He gained the favour of Pope Gregory XVI., who named him a *prelato*, and gave him some excellent ecclesiastical appointments. In 1841 Antonelli became under-secretary of state to the ministry of the interior; in 1844, second treasurer; and in the following year, finance minister of the two apostolic chambers. Pope Pius IX., having mounted the papal throne in 1846, raised Antonelli, during the next year, to the dignity of cardinal-deacon of Santa Agatha alla Suburra. In 1848 Antonelli was president and minister of foreign affairs in a liberal cabinet, which framed the famous *Statuto* or Constitution proclaimed in 1848, the principal articles of which were so very soon eluded. He accompanied the pope in his flight to Gaeta, and returned with him to Rome, and supported the reactionary policy. In 1855 an attempt was made upon his life. In the Vatican Council of 1869-70, Antonelli showed great tact and ability. He obstinately resisted all concessions to the growing national spirit of the Italian people; but his protestations against the progress of events in Italy were of no avail, and Victor-Emmanuel entered Rome in 1871. At the date of his death, 6th November 1876, the various posts held by Antonelli made him virtually prime-minister to the pope (see PIUS IX.). The vast property, £1,600,000, bequeathed to his three brothers, was vainly disputed by a *soldesante* daughter in a tedious and famous lawsuit (1877-9).

Antonello of MESSINA, an Italian painter, born about 1414, who introduced into Italy the Flemish methods of oil painting, which he had learned from the Van Eycks. He settled about 1473 in Venice, where he gained great renown as a portrait-painter, and died probably in 1493. His chief extant works are a Crucifixion at Antwerp, and a portrait in the Louvre, both of 1475, another portrait in Berlin, of 1478, and a St Sebastian at Dresden.

Antoninus, M. AURELIUS. See AURELIUS.

Antoninus, ITINERARY OF. See ITINERARY.

Antoninus Pius, TITUS AURELIUS FELIX, Roman emperor (138-161 A.D.), was born in the reign of Domitian, in the year 86 A.D. His family came originally from Nemausus, now Nîmes, in Gaul. Antoninus inherited great wealth, and early gave proof of excellent qualities. In 120 he was made consul; afterwards he was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won for him a higher reputation than had been enjoyed by any of his predecessors. In 138 he was adopted by the Emperor Hadrian, in consequence of his merit alone, and came to the throne in the same year. His reign was proverbially peaceful and happy. In his private character he was simple, temperate, and benevolent; while in public affairs he acted as the father of his people. The persecution of Christians, which was continued

during his reign, was partly stayed by his mild measures, and Justin Martyr's *Apologia* was received by him with favour. He was little engaged in war, except in Britain, where he extended the power of Rome, and built a wall between the Forth and the Clyde, as a defence against invasions by the predatory inhabitants of the north (see ANTONINUS, *Wall of*); but he was frequently employed in arbitration and general counsel on the affairs of foreign states. 'Happy the nation which has no history.' The reign of Antoninus illustrates this saying, for by his justice, wisdom, kindliness, and courtesy his vast empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the record of which forms the bulk of the history of the dark centuries of the Roman empire. It is said that only one senator was impeached during



Bronze Coin of Antoninus Pius,
commemorative of his victories in Britain.
(From a coin in the British Museum.)

the entire reign. Literature received great encouragement; the laws were improved; commerce extended; the means of communication were facilitated by the repair of roads and bridges; new sanitary regulations were introduced; and a taste for architecture fostered in the citizens. The epithet *Pius* was conferred on him on account of his conduct in defending the memory of his predecessor Hadrian against certain dishonouring measures brought forward by the senate. Antoninus died in 161 A.D. By his wife Faustina, whom he loved in spite of her unworthiness, he had four children, three of whom died, but one lived to be the wife of Marcus Aurelius, his adopted son and successor. The so-called Pillar of Antoninus, now in the *Piazza Colonna* at Rome, is that raised by the senate in honour of Marcus Aurelius, after his victory over the Marcomanni.

Antoninus, WALL OF, a Roman rampart erected between the Firths of Forth and Clyde, in 140 A.D., during the reign of Antoninus Pius, to restrain the encroachments of the northern tribes. The superintendence of the work is generally attributed to the imperial legate, Lollius Urbicus. Following the earlier line of Agricola's forts (81 A.D.), it extended 36 miles—the eastern termination being at Carriden, on the Forth; the western, near Old Kilpatrick, on the Clyde. The work consisted of a ditch about 20 feet deep and 40 feet wide, a rampart of earth and stone about 20 feet high and 24 feet thick at the base, and on the inner or south side of the rampart a paved military road, with a chain of twenty-one forts. The line of the wall may still be traced to a considerable extent. The most perfect fragments are near Castlecary, within the park of Callendar House, Falkirk; and on the slopes at Invercom, not far from Polmont station. It is commonly designated *Graba's or the Devil's Dyke*, *Grim* being an old English name for the devil. See *Waldie's Northern Roman Wall* (Lithgow, 1883).

Antoninus, MARCUS (MARK ANTONY), the Roman triumvir born about 83 B.C., belonged to

one of the oldest patrician families, and on his mother's side was related to Julius Caesar. His youth was wasted in dissipation, and finding himself pressed by creditors, he escaped to Greece in 58 B.C., where, for a while, he listened to the Athenian philosophers and orators. His studies here were soon interrupted by the proconsul Gabinus, who appointed him commander of his cavalry. In the campaign against Aristobolus in Palestine, and in Egypt, Antony distinguished himself by his courage and activity, and ingratiated himself with the soldiery. After assisting Caesar in Gaul, he went to Rome in 50 B.C., to uphold his great kinsman against the oligarchical party, and was appointed quaestor, augur, and tribune of the plebs. Next year, as one of Caesar's adherents, he was expelled from the curia, and fled to Caesar, who made this a pretext for his war against Pompey. At its outbreak, Antony received the appointment of commander-in-chief in Italy; in the battle of Pharsalia, he led the left wing of Caesar's army. In 47 B.C. he was made master of the horse by Caesar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself. He drank; he divorced his wife, and took up with an actress, Cytheris. In 44 B.C. he was made consul, and vainly endeavoured to prevail on the Romans to recognise Caesar as emperor. On Caesar's assassination, he played the part so finely described by Shakespeare; and by his funeral oration, with the well-timed display of Caesar's bloody robe, so wrought on the passions of the people, that the conspirators were forced to escape from Rome, leaving Antony in possession of almost absolute power. Next, we find him occupied in disputes and reconciliations with Octavian (see AUGUSTUS), besieging Mutina, and denounced by Cicero as an enemy of the state. The defeat of Mutina (43 B.C.) drove him a fugitive beyond the Alps; but in Gaul he visited the camp of Lepidus, and gained the favour of the army, of which he took the command. Plancus and Pollio joined him with their troops; and Antony, who so recently had escaped as a helpless fugitive from Italy, returned to Rome at the head of seventeen legions and 10,000 cavalry. Octavian, who had pretended to maintain republican principles, now threw off the mask, and held a consultation with Antony and Lepidus, near Bononia, when it was determined that these triumvirs should share the whole Roman world among themselves. To secure their spoil, they returned to Rome, and began their course of proscription and plunder. Among their first victims was Cicero, the orator whose eloquence they dreaded; and, in all, not less than 300 senators and 2000 *equites* are believed to have fallen. After securing Italy for themselves, and raising an enormous sum of money to carry on the war abroad, Antony and Octavian led their troops into Macedonia, and defeated Brutus and Cassius. Antony next paid a visit to Athens, and then passed over to Asia, to arrange his dispute with Cleopatra, queen of Egypt, whose conduct had offended the triumvirs. The queen herself appeared to answer his challenge, and captivated him by her beauty and address. The conqueror of Brutus and Cassius was made a prisoner, though not a prisoner of war. He followed Cleopatra into Egypt, and lived with her in idleness and luxury, until he was aroused by tidings of a quarrel in Italy between his own kindred and Octavian. This dispute gave rise to a short war, which came to an end before Antony arrived in Italy. A new division of the Roman world was now arranged, Antony taking the East, and Octavian the West, while Lepidus had to put up with Africa. Antony had confirmed his friendship with Octavian by a marriage with his sister, Octavia; but, returning now to

Cleopatra, he resumed his voluptuous mode of life, and was guilty of acts of the grossest injustice. Octavian used these facts to excite the indignation of the Roman people against Antony, and war between the rivals became inevitable. Antony, in his idleness, tried to postpone the coming conflict, and filled the island of Samos (where his troops were quartered) with musicians, jugglers, and buffoons. Meanwhile, at Rome, he was deposed from the triumvirate, and war was proclaimed against Cleopatra. Each party collected its forces, and in the naval engagement of Actium (31 B.C.) Antony was defeated. His hope of finding troops still faithful to him in Libya was disappointed; and he returned to Egypt, there, with Cleopatra, once more to forget his political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavian at Alexandria. Deserted by the Egyptian fleet, as by his own army, and deceived by a false report of Cleopatra's suicide, he killed himself by falling upon his sword, in the year 30 B.C.

Antony, St. surnamed **THE GREAT**, or **ANTONY OF THEBES**, the father of monachism, was born about the year 251 A.D., at Komæ, near Heraklea, in Upper Egypt. His parents were both wealthy and pious, and bestowed on him a religious education. Having sold his possessions, and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Catholic Church, and made him the model of monastic life. When 30 years of age, he penetrated further into the desert, and took up his abode in an old ruin on the top of a hill, where he spent twenty years in the most rigorous seclusion; but, in 305 he was persuaded to leave this retreat by the prayers of numerous anchorites, who wished to live under his direction. He now founded a monastery, at first only a group of separate and scattered cells near Memphis and Arsinoë; but which, nevertheless, may be considered the origin of cenobite life. After a visit to Alexandria in 311, he returned to his lonely ruin. In 335 the venerable hermit, then over a hundred years old, made a journey to Alexandria to dispute with the Arians; but feeling his end approaching, he retired to his desert home, where he died, 356 A.D. Athanasius wrote his Life. His festival is kept on the 17th January.

ST ANTONY'S FIRE was the name given to a pestilential epidemic, also called the *scorid fire*, which in 1089 swept off great numbers, especially in France; it being held that many sufferers had been cured through the intercession of St Antony, especially by prayer before his relics. The disease was commonly supposed to be erysipelas, which usurped the name of St Antony's Fire; but more probably it was a form of Raphania (q.v.), caused by eating ergot of wheat or rye. See Haser, *Geschichte der Epidemischen Krankheiten* (Jenn. 1867).

Antony of Padua, St. was born at Lisbon, August 15, 1195, and on the father's side was related to Godfrey of Bouillon. He was at first an Augustinian monk; but in 1220 he entered the Franciscan order, and became one of its most active propagators. He preached in the south of France and Upper Italy, and died at Padua, June 13, 1231. He was canonised by Gregory IX. in the following year. He himself practised the most severe asceticism, and opposed vigorously the movement for mitigating the severity of the Francis in rule led by Elias of Cortona. According to legend, he preached to the fishes when men refused to hear him; hence he is the patron of the lower animals, and is often represented as accompanied

by a pig. His monument, a fine work of statuary, is in the church which bears his name at Padua.

Antraigues, EMANUEL DELAUNAY, COMTE D', a great politician, with a very ambiguous character, was born at Villeneuve de Berg, in the département Ardèche, in 1755. His talents were first displayed in his *Mémoires sur les États-généraux* (1788). This book, full of daring assertions of liberty, was one of the first sparks of the fire which afterwards rose to such height in the French Revolution. In 1789, when Antraigues was chosen as a deputy, he defended the privileges of the hereditary aristocracy, ranked himself with those who opposed the union of the three estates, and maintained that the royal veto was an indispensable part of good government. After leaving the Assembly in 1790, he was employed in diplomacy at St Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803 he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure, entitled *Fragment du XVIII. Lièvre de Polybe, trouvé sur le Mont Athos*. He afterwards came to England, and acquired great influence with Canning. On July 22, 1812, he was murdered, with his wife, at his residence near London, by an Italian servant.

Antrim, a maritime county in the N.E. of Ireland, in the province of Ulster, stands second among the Irish counties in population, but in size only ninth. Its greatest length is 57 miles; its greatest breadth, 28; its extent of sea-coast, 90; and its area, 1192 sq. m. Of this, rather more than three-fourths is in tillage and pasture; and one per cent. under wood. Off the north coast lie Rathlin Isle and the Skerries; and off the east coast, the Maiden Rocks. The east coast is hilly; and from Larne to Fair Head, parallel mountain-ranges of no great height, and covering a third of the county, stretch S.W. into the interior, forming valleys opening seaward, called the Glens of Antrim. The interior slopes towards Lough Neagh. The highest eminences are—Trostan, 1810 feet; and Slievenish, or Slemish, 1782. The principal streams are the Bann, from Lough Neagh to the Atlantic; the Main, running parallel to the Bann, but in the reverse direction, into Lough Neagh; and the Bush, flowing north into the Atlantic. Many peat-bogs occur in the county. Six-sevenths of the surface consists of igneous rocks (trachyte, porphyry and basalt-rock), often alternating with bands of a red clay or *bole*, and overlying cretaceous and jurassic strata, new red sandstone, and metamorphic rocks. The basalt-rocks, or old lava-flows, have frequently a columnar structure. Between Ballycastle and the mouth of the Bann, the basalt assumes very picturesque forms; and the Giants' Causeway (q.v.) is one of the most perfect examples of columnar basalt in the world. Fine salt-mines occur at Duncane and Carrickfergus; and small coal-fields near Ballycastle and in the interior. Rich beds of iron ore of fine quality have been recently opened in Glenravel, and a large export has been carried on from Cushendall and Carnlough. The soil of Antrim is mostly light, and the chief crop is oats. The land is very much subdivided. The rearing of flax, and the various branches of the linen, cotton, and coarse woollen manufacture are the staple industries. The principal towns are Belfast, Lisburn, Ballymena, Ballymoney, Carrickfergus, Larne, and Antrim (pop. 1647). County Antrim returns four members to parliament: Belfast borough, four. Pop. (1841) 351,496; (1881) 421,943, of whom 190,746 were Presbyterians, 108,344 Roman Catholics, 98,161 Protestant Episcopalians, and 11,842 Methodists. The large number of Presbyterians

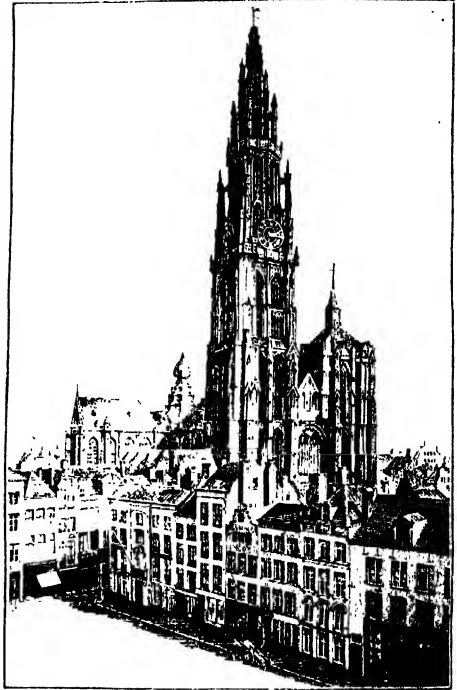
is due to the fact that the county was extensively colonised from England and Scotland. The original possessors were the O'Neills, who, in 1333, regained the whole country, except Carrickfergus and part of the Glens held by the Bissets of Glenarm. The forfeiture of Shane O'Neill, in the reign of Elizabeth, terminated the dominion of his race.

Ant-thrush, a general name applied to birds of tropical and sub-tropical countries, which feed to a large extent upon ants. The American Ant-thrushes (Formicariidae) include a large number of noisy lush-birds, with comparatively sober plumage, while the Old-World forms (Pittidae) are brilliant. The latter extend from the Malayan region eastwards. Both families belong to the order of Passerine birds. See BUSH-SHRIKE, PASSERES, and BIRDS.

Antwerp (Fr. *Anvers*; Flem. *Antwerpen*, 'on the wharf'), the capital of the province which bears its name, and the chief commercial city of Belgium, is situated on the river Scheldt, 52 miles from the sea, and 27 N. of Brussels. It is the Liverpool of the Continent, and the tonnage of vessels entering its port has increased tenfold within thirty years, until it stands at about 4,000,000 tons annually. The trade and manufactures of Antwerp have so extended, that the large dock and quay accommodation having been found too limited, a new quay, 2 miles in length, and docks have been constructed at a cost of nearly £1,000,000, which were opened by the King of the Belgians in July 1885. Arrangements have also been made for additional dock space on the opposite side of the Scheldt if required. The merchants of the town are noted for their enterprise, many of them being largely interested in the South American trade. Besides the railway system, the Scheldt and the canals which intersect Antwerp give communication with other Belgian towns. The imports include all the products in common use amongst an industrial and commercial community. The chief exports are flax, sugar, iron, woollen goods, metals, glass, and tallow. The manufactures consist chiefly of sugar, white lead, cotton goods, lace, linen-thread, sewing silk, black silk stuffs, starch, petroleum, and printers' ink. There are also to be mentioned tobacco-manufacture, the cutting of diamonds and other precious stones, and shipbuilding. The chief public institutions are—the Academy of Sciences, Academy of Painting and Sculpture, a Medical and Surgical School, Naval Arsenal, Museum (with specimens of the pictures of Rubens, Vandyck, Titian, and Matsys), Zoological Gardens, the Flemish Theatre, and the Plantin Museum (1876). The six-aisled cathedral (1352-1518), the noblest Gothic structure in Belgium, is 500 feet in length by 250 in breadth, with a roof supported by 125 pillars, and an exquisite spire, 403 feet high, in which hangs a splendid carillon of 99 bells. The interior is enriched by the two greatest of all the pictures of Rubens, the *Elevation of and the Descent from the Cross*. In the image-breaking riot of 1566 by the populace of Antwerp, the cathedral was at the mercy of the iconoclasts, when every statue was hurled from its niche, and every picture torn from its walls. The church of St James contains the monument of the Rubens family. The Exchange (1531), a fine building, is said to have been Gresham's model of the old London Exchange. It was burnt in 1858, but rebuilt in the same style, and reopened in 1872. The hôtel-de-ville (1565) is a fine building in the Renaissance style. The old fortifications were demolished in 1860, though Alva's famous citadel (1567) stood till 1874; and since 1851 new fortifications have been erected outside the city, with

detached forts to the south-east, rendering the commercial capital of Belgium one of the most strongly fortified places in Europe. Pop. (1846) 88,487; (1873) 126,663; (1886) 193,174.

Antwerp is mentioned as early as the 8th century; in the 12th and 13th it gave signs of considerable prosperity, and in the beginning of the 16th century it was the commercial capital of the world. Its



Antwerp Cathedral.

government was free, and its people prosperous and well educated. When in 1576 it was seized by the Spanish soldiery, it is estimated that 8000 human beings were murdered; and the city-hall and nearly a thousand fine buildings were burnt. The effect of this, and the assault of the Duke of Parma in 1585, caused Antwerp to sink into decay, and its population was scattered. From 1794 till 1814, while it was held by the French, Napoleon attempted to make it a great military and commercial centre. The union of Belgium with Holland in 1815 was very favourable to the commerce and general prosperity of Antwerp. By the revolution of August 1830, it was linked to the destiny of Belgium. When the revolutionary party gained possession, the Dutch commandant, General Chassé, retreated to the citadel, and, exasperated by the breach of truce, caused a bombardment, which destroyed the arsenal and about thirty houses. In 1832 a French army of 50,000 men, under Marshal Gérard, appeared before Antwerp, to demand the surrender of the citadel, which General Chassé refused. After the interior of the citadel had been reduced to ruins by the French artillery, General Chassé capitulated. The city was handed over to the Belgians, and since the treaty of 1839, Antwerp has had a singularly prosperous career. Amongst the eminent names associated with Antwerp are the painters Matsys, Rubens, Vandyck, Teniers, Van Brée,

and Jordaens, with Van Meteren, historian, and Conscience the novelist; statues have been erected to the first five of these, as also to Leopold I., Van Ryswyck, and others. French is the business language, but the majority of the inhabitants speak Flemish.

Anu'bis, an Egyptian deity, a son of Osiris, identified by the Greeks with Hermes. He is represented on monuments as having the head of a jackal, with pointed ears and snout, which the Greeks frequently changed to those of a dog. His office, like that of Hermes *Psychopompos* among the Greeks, was to accompany the ghosts of the deceased into Amenthes, the under-world, and there along with Horus to weigh their actions before Osiris.

Anupshahr, an ill-built, crowded town of India, in the British district of Bulandshahr, North-west Provinces, on the right bank of the Ganges, 73 miles SE. of Delhi. Pop. 14,000.

Anu'ra. One of the main divisions of Amphibia, containing the frogs and toads. See AMPHIBIA, FROG, TOAD.

Anus, the term applied by anatomists to the lower, or (in the case of animals) the posterior aperture of the intestinal canal; the rectum terminating externally in the anus. With regard to its anatomy, it is sufficient to state that it is kept firmly closed on ordinary occasions by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening, and, by its attachment to the coccyx behind, and to a tendinous centre in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the feces or intestinal evacuations; while the latter, or *internal sphincter*, is an aggregation of the circular muscular fibres of the lowest part of the rectum, and acts in contracting the extremity of the tube. The main function of the *levator ani* muscle is expressed in its name, it being the antagonist of the diaphragm and other muscles which act in the expulsion of the feces. The integument around the anus lies in radiating plis, which allow of its stretching without pain during the passage of the feces; and the margin is provided with a number of sebaceous glands, which, in some of the lower animals, secrete strongly odorous matters (see AXIAL GLANDS).

Infants are occasionally born with an *imperforate anus*, or congenital closure of the rectum. In the simplest and most common form of this affection, the anus is merely closed by thin skin, which soon becomes distended with the Meconium (q.v.), and can easily be divided. Cases where the obstruction is at a higher point are more serious; but even these can generally be relieved by a surgical operation. When this is neglected or is unsuccessful, death speedily takes place, with symptoms resembling those of intestinal obstruction from any other cause. *Spasm of the sphincter ani* is characterised by violent pain of the anus, with difficulty in passing the feces. It is almost always caused by the presence of an ulcer or fissure, or by some morbid condition in neighbouring parts. *Ulceration* occurring as a breach of surface at one or more points around the anus, but not extending within the orifice, is sometimes met with; but more common and important is *fissure of the anus*, a term applied to a crack, or superficial ulceration, situated between the folds of the skin and mucous membrane at the verge of the anus, and extending within the rectum. It gives rise to intense pain during the passage of the evacuations, and for some hours afterwards to great discomfort, smarting, and itching. The treatment to be adopted is to endeavour to procure

regular and somewhat soft evacuations, and to sponge with warm water immediately afterwards, the parts being dried with a soft cloth. In slight and recent cases, one or two applications of solid nitrate of silver, with the use of a mild astringent lotion, will sometimes cure the disease. Where the pain is severe, division of the base of the fissure by the knife, or by stretching, is usually necessary. *Pruritus ani*, which simply means intense itching and irritation of this part, is usually a symptom of morbid changes rather than a special disorder; but sometimes occurs alone, and is often a very distressing and obstinate affection. It is often associated with an unhealthy state of the intestinal secretions, or with simple constipation; with a congested state of the mucous membrane; with a disordered condition of the womb; with the presence of thread-worms in the rectum, &c.; and it is peculiarly common in persons whose occupations are sedentary. The affection is often much aggravated by the patient's being unable to refrain from scratching the parts, which leads to excoriations, ulcerations, thickening of the skin, &c. Treatment must of course first be directed to these associated conditions, when present; and with their removal the irritation often disappears. A lotion containing carbolic acid, hydrocyanic acid or cocain, or an ointment composed of a drachm of calomel to an ounce of lard, often gives relief. To prevent the reappearance of ulcerations, &c., a strong astringent lotion should be used to bathe the parts night and morning. The other principal affections of the anus are Fistula, Piles, and Prolapsus, which are discussed in special articles.

Anville. See D'ANVILLE.

Anwari, a celebrated Persian poet who flourished during the 12th century, was born in Khorassan, and became a favourite of the Seljuke sultan, Sanjar. His poems consist chiefly of lengthy panegyrics and shorter lyrical effusions. The latter (*ghazels*) are characterised by simplicity, ease, and naturalness, but the *kasidas*, long poems mainly in praise of his patron, are distinguished by extravagant imagery and historical conceits. They abound in keen sarcasm against others. Anwari, who was also one of the most notable astrologers of his time, died between 1191 and 1196.

Aonlaganj, or AONLAH, a town of India, in the British district of Bareilly, 21 miles SW. of Bareilly, on the route to Aligarh. It has a large bazaar. Pop. 11,000.

Aorist (Gr. *aoristos*, 'unlimited'), a form of the Greek verb by which an action is expressed as taking place in an indefinite time. It corresponds to the simple past tense in English, as 'he died.' The Greek language is especially fertile in the past tenses of verbs, having, in addition to the tenses common to other languages—namely, the imperfect, perfect, and pluperfect—the aorist, which is peculiarly adapted to the narrative style of writing. The distinction of first and second aorist is purely formal.

Aorta is the great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. The aorta in man is subdivided by anatomists into the arch, the thoracic aorta, and the abdominal aorta. The arch is a loop with the convexity directed upwards, forwards, and to the right side, reaching at its highest part to a level with the upper border of the cartilage of the second rib. Changing its direction, it runs from right to left, and from before backwards to reach the left side of the spine, with which it first comes in contact between the fourth and fifth dorsal vertebra. Here it descends, and at the lower border of the fifth dorsal vertebra it becomes the thoracic aorta. Five arteries

arise from the arch—viz. two coronaries, for the supply of the muscular tissue of the heart itself; the innominate, dividing into the right common carotid and right subclavian arteries; and the left common carotid and left subclavian arteries.

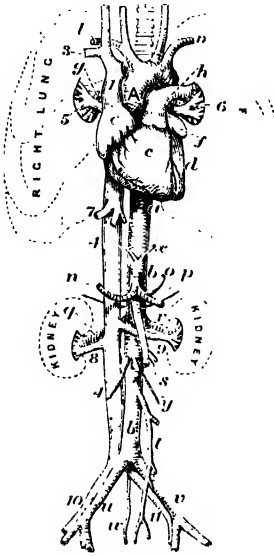


Diagram of the Aorta, with its principal Branches :

- A*, ascending part of the arch of the aorta; *a*, thoracic aorta; *bb*, abdominal aorta; *c, d*, right and left ventricles of heart; *e, f*, right and left auricles of the heart; *g, h*, right and left pulmonary arteries; *i, k*, right and left common carotid arteries; *l, m*, right and left subclavian arteries; *n*, hepatic artery; *o*, gastric artery; *p*, splenic artery; *q, r*, right and left renal arteries; *s, t*, superior and inferior mesenteric arteries; *u, v*, right and left common iliac arteries; *w*, middle sacral artery; *x*, phrenic arteries; *y*, spermatic arteries.
- 1, superior vena cava; 2, right internal jugular vein; 3, right subclavian vein (the left is removed to show the arch of the aorta); 4, inferior vena cava; 5, 6, right and left pulmonary veins; 7, hepatic veins; 8, 9, right and left renal veins; 10, 11, right and left iliac veins; 12, trachea.

At the commencement of the arch are three small swellings or pouches, the aortic sinuses, internal to which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood into the heart. The thoracic aorta extends from the lower border of the fifth dorsal vertebra to the diaphragm, gradually getting into the middle line of the spine. The thoracic aorta gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the oesophagus, and intercostal arteries, to supply the walls of the chest (usually nine on each side, the upper two intercostal spaces being supplied by a branch from the subclavian artery). The abdominal aorta passes from the diaphragm to the fourth lumbar vertebra, opposite the body of which it divides into the two common iliac trunks. The abdominal aorta gives off: (*a*) Branches to the abdominal viscera. These are either single or in pairs. The single arteries are—the celiac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric, for the small, and part of the large intestine; the inferior mesenteric, for the large intestine not supplied by the superior mesenteric. The paired arteries are the supra-renal, renal, and spermatic or ovarian. (*b*) Branches to the abdominal walls—viz. the two phrenic arteries to the diaphragm; the lumbar arteries, four or five pairs, for the

supply of the lower part of the abdominal wall (the loins); the middle sacral or caudal artery, a small vessel which arises from the back of the aorta just above its point of bifurcation. In fish and animals with tails, this branch is the caudal prolongation of the aorta.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. The structure of the aorta will be given under **ARTERIES**; and the comparative anatomy under **CIRCULATION**.

During fetal life, there is a communication between the arch of the aorta and the pulmonary artery, called the *ductus arteriosus*, the canal of which becomes obliterated after birth. In the human carotid artery, it has been calculated that the blood-stream moves with a velocity of 10½ inches per second, and that the pressure of blood in the same vessel would support a weight of 3 lb. 2 oz. to the square inch.

The coats of the aorta are very subject to fatty disease termed *Atheroma* (q.v.), and in advanced life, to calcareous degeneration or deposit of lime-salts, which destroys their elasticity. This change renders them very liable to *Aneurism* (q.v.), which, as may be expected, is generally situated at the curves of the aorta, especially at the arch, where the force of the blood stream is greatest.

Aosta, a cathedral city of Italy, on the Dora Baltea, 19 miles from the opening of the great St Bernard Pass, and 80 miles N.W. of Turin by rail. It is surrounded by rich orchards, vineyards, and almond plantations, but the town itself is gloomy and irregular. It is the ancient *Augusta Prætoria*; and several monuments of the Roman times still remain. St Bernard was archdeacon of Aosta; and here Anselm, Archbishop of Canterbury, was born. Near by are the celebrated baths and mines of St Didier, and the scenery in the neighbourhood is remarkably picturesque. Pop. (1881) 5672. The beautiful valley of Aosta, between the Graian and Pennine Alps, is rich in woods, pastures, and minerals, and mineral wells (including Courmayeur). Cretinism prevails to a lamentable extent, and few persons are altogether free from goitre. French is the language generally spoken.

Apaches, a tribe of North American Indians, formerly very fierce and numerous, living in portions of Texas, New Mexico, and Arizona, and belonging to the Athabaskan family. They were long the scourge of the frontiers, and resisted obstinately every attempt to civilise them. Long after the annexation of their territory by the United States, they continued their raids in spite of severe defeats. An attempt made by the United States government to confine the Apaches within a reserved territory in Arizona led to bloodshed in 1871. The numbers of the Apaches proper within the United States may be put at nearly 7000.

Apatin', a market-town of Hungary, in the county of Bacs, on the left bank of the Danube, 49 miles S.W. of Theresiopol. It has manufactures of woollen cloth, and a considerable trade in hemp, silk, madder, and wool, the products of the vicinity. Pop. (1881) 11,973.

Apatite (Gr. *apatē*, 'deception'), a mineral so named because it resembles various other minerals for which it might be mistaken, consisting chiefly of phosphate of lime. The different varieties of apatite contain a little fluoride or chloride of calcium, or both, as well as phosphate of lime. Of these varieties, besides those already mentioned, there are others, as *Moravite*, *Francolite*, and *Asparagus Stone*. It occurs both massive and in crystals, which are generally small, and are often six-sided prisms, or six-sided tables, but some very large ones have been brought from Canada. It

occurs in some of the tin mines in Cornwall, Saxony, Bohemia, &c., and in rocks of various ages, as mentioned above. It is found of various colours, more or less green, blue, or red, sometimes white, and often gray. It frequently occurs, generally in the form of small needles, as a rock-constituent, in such rocks as granite, dolerite, diorite, &c. The massive radiated variety of apatite is called *phosphorite*, and when massive, earthy, and impure, it is known as *osteolite*. These massive varieties may occur in veins, beds, or irregular masses, and are perhaps most abundantly met with amongst the archæan rocks. At Estremadura, in Spain, they occur in cretaceous strata. These mineral phosphates of lime have been much used in the preparation of manures, but as they generally require expensive mining and reduction, their production has to some extent fallen off—the most abundant supplies of lime-phosphates being at present obtained from phosphatic nodules or Coprolites (q.v.). Commercially, any natural lime-phosphate is known as apatite. Hence phosphatic nodules, and the interesting 'rock-guano,' called *osite* or *Somberrite*, are alike spoken of as apatite. Somberrite has been obtained in large quantities from the small island of Sombro, to the east of the Virgin Islands, in the British West Indies. It is now believed that this hard or rock guano has been formed by water filtering through ordinary guano into the coral rock adjoining, and turning it more or less completely into phosphate of lime. The general treatment to which mineral phosphate is subjected is to reduce it to powder, and act upon the pulverised matter with sulphuric acid, which renders the phosphoric acid in the apatite soluble in water, and thereby facilitates its introduction into the plant. See MANURE.

Ape, a term generally applied to the lower Primates or Simiina family, including the vast majority of monkeys, with the exception of the anthropoids on the one hand, and the lemurs, or semi-apes, on the other. Thus defined, the apes include (a) the *Arctopitheciini*, or marmosets, small burry South-American forms like squirrels—e.g. Hapade and Midas; (b) the *Platyrrhini*, or broad-nosed New-World apes, almost always quadrupedal, without cheek-pouches or callosities on the hips—e.g. Mycetes or howling-monkey, Cebus or Capuchin, Ateles or spider-monkey, Pithecia, Chrysotrithix or squirrel-monkey, and Nyctipitheci; (c) the majority of the *Catarrhini*, or Old-World monkeys, with a narrower partition between the nostrils, and never with prehensile tail. Only the lower forms, or Cynomorpha, are included in this classification, the higher Anthropoids being separated (after Hartmann) to form along with man the higher family Primarii. The Cynomorpha (dog-like) include Baboons (*Cynocephalus*), Mandrills (*Papio*), Macaques, the Barbary Ape (*Luus*), Cercopitheci, Colobus, the Sacred Monkey (*Simnopitheci*), &c. See MONKEYS, ANTHROPOID APES.

Ap'eldorn, a flourishing town of the Netherlands, in the province of Gelderland, 17 miles N. of Arnheim. The Loo, a royal hunting-lodge, beloved of William of Orange, is in the neighbourhood. There are no less than forty paper-mills in Apeldorn, most of the paper manufactured being sent to the East Indies. Other industries are agriculture, grinding corn, copper-founding, and manufacturing blankets and coarse woollen cloth. Pop. (1883) 16,283.

Apelles, the most celebrated painter in ancient times, was the son of Pytheas, and was probably born at Colophon, on the Ionian coast of Asia Minor. He flourished in the latter part of the 4th century B.C., received his first instruction in art

under Ephorus in the Ionian school of Ephesus, and afterwards at Sicyon, and thus he united the fine colouring of the Ionian with the accurate drawing of the Sicynic school. During the time of Philip, he visited Macedon, where he became the intimate friend of Alexander the Great. Pliny relates that on one occasion when Alexander visited Apelles in his studio, the king exhibited such ignorance of art, that the artist recommended him to be silent, as the boys who were grinding the colours were laughing at him. He is said to have accompanied Alexander on his expedition to Asia, and to have settled at Ephesus. The most celebrated paintings of Apelles were his Anadyomene, or Aphrodite rising from the Sea, the Graces, and others on similar subjects. His portrait of Alexander wielding a thunderbolt was very famous. Apelles willingly acknowledged the merits of his contemporaries. When his pictures were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is said that Apelles instantly rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place, and told the cobbler to stick to his last; or, in the Latin version, which has become proverbial, 'Ne sutor supra crepidam (judicaret).' All that we know of his art is derived from late Greek and Roman authors; but he seems to have combined many of the excellences of his predecessors. He did not belong to the noblest period of art, and seems to have been more remarkable for skilful effects and elaborate finish than for originality.

Apennines (Ital. *Appennini*, Lat. *Mons Apenninus*: from Celtic *pen*, 'a head' or 'mountain-height'), a mountain-chain extending 740 miles uninterruptedly throughout the whole length of the Italian peninsula. It belongs to the system of the Alps, from which it branches off near Savona. From this point, the chain, under the name of the Ligurian Apennines, girdles the Gulf of Genoa, in the immediate vicinity of the sea, and then runs inland, forming the watershed between the Adriatic and the Mediterranean, but gradually approaching the east coast, till, in the highlands of the Abruzzi, it is close upon it; after which it takes a southerly direction through Naples, dips under the sea at the Strait of Messina, and reappears on the northern coast of Sicily. The chain is divided by geographers into the *Northern*, the *Central*, the *Southern*, and the *Sicilian Apennines*. The leading feature of the Apennines, wherever they approach the coast, is their extraordinarily steep declivities; while in Middle Italy and the adjoining portions of Upper and Lower Italy, long terraced plateaus, lower ranges, and extensive coast-plains mark their gradual descent on the west. The main chain of the Apennines does not send off spurs into the Apulian peninsula.

The direction of the great chain of the Apennines is favourable to the formation, on the west side, of largish river-basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while on the east side we find nothing but small streams, in most cases destitute of affluents, hurrying down to the sea through wild precipitous valleys.

The average height of the entire chain of the Apennines is about 4000 feet, which, however, in the north, sinks down to little more than 3500 feet; and in the mountains of the Abruzzi, rises to 7000 feet. Here, in Monte Corno, the highest peak of the range known under the name of Gran Sasso d'Italia, they reach an elevation of 9574 feet, and in Monte Velino, of 7916 feet.

The Apennines are crossed by thirteen principal passes; and seven of these are traversed by the

railway. The strata which compose the Apennines are principally of Jurassic, Cretaceous, and Tertiary age. The central ridges, especially in the middle and south, consist largely of Jurassic limestones, &c. These are flanked on the north-east and south-west by more or less interrupted belts of Cretaceous rocks, which again are overlaid by Pliocene formations. In the north, rocks of Eocene and Miocene age predominate. The Apennines, especially the Roman and Neapolitan, are distinguished by the rich variety of marbles which they contain. Volcanic rocks abound in the middle and southern regions.

The principal chain exhibits, for the most part, a dreary and barren appearance. It looks like a vast wall, with very few projecting peaks to break its dull monotony. Only in the Abruzzi, in the Sub-Apennines, and above all, in the marble mountains of Carrara and Seravezza, do the bold and magnificent forms of the Alps appear. Where water is plentiful there is no lack of rich pastures and dense forests; but usually only thin grass and wild scrubby bushes cover the stony slopes. The greater number of the forest brooks, with deep rocky ravines, display, during summer, only a dry bed. Where the mountains dip down to the sea, as at the Riviera of Genoa and the Gulf of Naples, a rich, peculiarly southern vegetation clothes the declivities. There is no region of perpetual snow; but the summits of the Abruzzi and the lofty peaks of Lunigiana are often covered with snow from October far into May, and send their icy breath so suddenly down into the mild valleys, that the temperature in a few hours sinks 12 or 18° F.

Apennade, a town in the Prussian province of Sleswick-Holstein, at the head of a gulf in the Little Belt, 66 miles NNW. of Kiel by rail. It has a court-house, a naval school, and an excellent harbour, with a considerable amount of shipping. Pop. (1885) 6068.

Aperients are substances which are employed to cause intestinal evacuations. Many articles of food, such as oatmeal, brown bread, and bran biscuits, and fruits such as figs, prunes, and strawberries, are used for this purpose; but the term is usually applied to denote certain medicines which act upon the intestines and cause them to expel their contents. Although considerable progress has been made in recent years in the investigation of the action of various drugs upon the intestines, we are as yet unable to give a final classification to them. For practical purposes, however, we may classify aperients as follows: (1) laxatives and (2) purgatives—(a) cathartic and (b) drastic. (1) Laxatives are substances which only slightly increase intestinal action. They act without causing any irritation or griping. The chief examples of this class are menna, magnesia, olive oil, sulphur, and castor oil in small doses. (2) Purgatives—(a) Cathartics are substances which quicken or increase the evacuations from the intestines, and their action may cause griping. Examples of this class are aloes, castor oil in large dose, rhubarb, senna, and various species of rhamnus; (b) drastics are substances which are prompt, powerful and effective in operation. Colocynthis, croton oil, elaterium, gamboge, jalap, podophyllin, and many others belong to this class. Besides the substances already enumerated, we must mention the saline aperients—e.g. sulphates of potassium, sodium, and magnesium, tartrates of potassium and sodium, phosphate of sodium, and citrate of magnesium. Of the above drugs, Litarivac (cf. potassium, elaterium, and gamboge) act as hydragogues (Gr. *hulōr*, 'water,' and *apo*, 'I drive away'), as they tend to remove water from the system; and aloes, euonymin, iridin, mercurial preparations (blue

pill, calomel), podophyllin, and rhubarb, act as cholagogues (Gr. *cholē*, 'bile'), as they increase the evacuation of bile. Purgatives may be said to act in three ways: (1) by increasing the peristaltic action of the intestines; (2) by causing an increase of the secretion from the intestinal mucous membrane; and (3) by preventing the absorption of the fluids of the intestines. Purgatives have various uses, for they not only remove the contents of the intestines, but also prevent the accumulation of faeces in them, and the irritation such accumulation causes. They are useful in cases of dropsy, to remove excessive fluids from the body. In fever they lower the temperature, and they are of use in lowering the blood pressure in certain diseases. Lastly, in cases of hernia, aneurism, and some other disorders, they are beneficial in preventing difficulty in the act of defecation. Although the use of aperients is of undoubted benefit, yet their abuse is much to be deprecated, as to employ them habitually or promiscuously may produce serious results. There are also used as aperients many Mineral Waters (q.v.).

Apetalous ('without petals'), a term applied somewhat indefinitely to those flowering plants in which the petals are absent. It represented a distinct subdivision in A. de Jussieu's classification, Apetale—broadly corresponding to Monochlamydeae (q.v.) of later authors, but is more convenient as a merely descriptive term, since the absence of petals occurs not only in entire groups, like the catkin-bearing Amentaceae, but in degenerate forms in many unrelated orders. When both calyx and corolla are absent, the term *achlamydeous* (Gr. *chlamos*, 'a covering') is often used.

Aphasia is the term originally introduced by Tronssseau to denote the inability to express thought by means of speech which follows certain diseases of the brain; in recent years, however, it has obtained a wider significance, and may now be defined as the loss of the faculty of interchanging thought, without any affection of the intellect or will. The interchange of thought involves, in the first place, the expression of mental processes by means of conventional symbols, and, in the second place, the comprehension of these symbols. Language, in its widest sense, includes all the methods by which thought may be communicated, and makes use of three classes of symbols: gestures, speech, and writing. The interchange of thought may be interrupted by derangement (1) of the expression of mental processes by their corresponding symbols, or (2) of the comprehension of the meaning of these symbols. In other words, there may, on the one hand, be an interference with the channels through which thought is translated into symbols; and, on the other hand, there may be a derangement of the channels by means of which symbols are interpreted as thought. In the former case, the change affects the mechanism conducting from the mental idea to the symbol, which is often termed the motor symbol process; in the latter, there is an alteration in the mechanism conducting impulses from the symbol to the mental idea, often called the sensory symbol process. There is therefore a motor and a sensory aphasia, and either of these may affect one or more of the three classes of symbols mentioned above.

In *motor aphasia*, if the memory of the co-ordinated movements necessary for the formation of symbols, and this usually includes gestures, speech, and writing. The inability to write is commonly termed *agraphia*. The patient is unable to originate the name of any object shown to him, although he evidently knows what it

is, and he cannot reply to any question although he clearly understands it. Sometimes when he is shown an object and asked if it bears a name mentioned, he may be able to show acquiescence or dissent by means of gestures, but usually even this power is absent. In *sensory aphasia*, there is loss of the memory of the meaning of symbols. This may affect the recollection of spoken language. The patient can hear every sound, but cannot understand a single spoken word. He can speak himself with more or less fluency, but without understanding his own words, or detecting any errors he may make, and in speaking he usually commits many mistakes; he can also read printed and written language, and he can write himself. This condition is termed word-deafness. Sensory aphasia may also be due to a loss of the recollection of written, printed, or gesture language. The sight is sufficiently good to enable the patient to distinguish objects clearly in most cases (although the extent of the field of vision is often somewhat diminished), and he can name these objects quite correctly. He is able to converse perfectly, and to write either his own thoughts or to dictation, but he cannot read what he has written, or detect any mistakes in it. He can slavishly copy printed and written words, as if he were drawing, without understanding their meaning, and he copies all mistakes. This is what is known as word-blindness.

It must never be forgotten that all these varieties of aphasia are entirely independent of any affection of the intellect. Aphasia must further be carefully distinguished from mere loss of speech caused by difficulty in articulation due to paralysis. This condition is commonly known as *aphemia*. Turning to the localisation of the diseases which cause the different varieties of aphasia, we find that our knowledge has recently been much extended, not only by the careful observation of clinical and pathological facts, but also by the results of experimental investigation. These two methods of inquiry are both of great use in checking their several facts. While the individual muscular acts required in the motor symbol process are ruled by centres in the spinal cord and medulla oblongata, the seat of the memory of their co-ordinated movement is in the brain. It may be well to mention here that the nerve-impulses cross from one side of the body to the other in their course from centre to periphery, and *vice versa*. While the majority of mankind therefore are right-handed, they are also left-brained. The greater use of the left half of the brain applies to the communication of ideas in every way. No doubt the right side takes up the work of the left, after a time, in the case of any lesion, and this is more especially the case when the affection has come on in early life. In the lower part of the frontal lobe of the brain are situated the centres concerned in the co-ordination of the muscular acts in articulation, the exact position being the third or lowest convolution, usually called Broca's convolution in honour of the distinguished man who first pointed out the connection between disease in this spot and aphasia. Any lesion in this region causes motor aphasia, and if both sides of the brain are affected, this will be complete and permanent. A little higher in the frontal lobe are the centres for gesture and for writing. The auditory perception of words has its centre in the highest convolution of the temporosphenoidal lobe. Disease of this part of the brain causes word-deafness. The visual perception of words depends on the integrity of the angular gyrus of the parietal lobe, and if this convolution is affected, the symptom described as word-blindness ensues. See BRAIN.

Aphelion, that point in the elliptical orbit of a planet which is most remote from the sun. The opposite point, or that nearest to the sun, is styled the Perihelion. At the former point, the swiftness of the planet's motion is least, and begins to increase; at the latter, it is greatest, and begins to decrease. This irregularity of motion is most remarkable in comets whose orbits deviate most from the circle. The word is a Grecised form of Kepler's Lat. *aphelium*, from Gr. *apo*, 'from,' and *hēlios*, 'sun.' See APSES, ORBIT.

Aphemia (Gr., 'voicelessness'), a form of Aphasia (q.v.), in which words are understood and remembered, but the power to utter them is lost.

Aphides (Gr.), a family of small 'plant-lice' belonging to the order of hemipterous insects. They occur very abundantly in temperate regions as parasites on the roots, leaves, stems, &c. of plants, to which they frequently do great damage. Towards the tropics they seem to be replaced by the families to which the cochineal insects and Cideas belong. The Rose Aphis, the 'colliers' of the bean-plant, the cottony 'American blight' of apple-trees, and the Phylloxera (q.v.) of vines, are too familiar representatives of the family. The mouth organs are adapted for piercing and sucking plants, and consist of four long sharp stylets within a proboscis or sheath. The posterior end of the body usually bears two projecting honey-tubes, which emit a sweet secretion. Wings may be absent in both males and females, but are usually present in the former, and absent in a section of the latter to be afterwards noted. The legs are long and slender, but not adapted for rapid movement; in fact, the aphides rarely wander far from their birthplace, except during the spring and autumn migratory flights of the females. Many forms migrate at the beginning of summer to another kind of plant, and return in autumn to their original haunt; but others seem to restrict their attentions to one form. The body is often brightly and protectively coloured, very frequently green or brown. They are generally distended over with a protective mealy substance, and many forms exhibit a silky or cottony coat, secreted from skin glands.

Their presence is readily detected by marks, wrinkles, or abnormalities on the infested plant, and notoriously also by the 'honey-dew' which they secrete. This glutinous sweet substance which covers the leaves of trees, &c., especially during warm weather, is sometimes abundant enough to drop to the ground. It has excited interest from very early times, and has a widespread popular reputation for medicinal virtues. Pliny hesitates whether he ought to regard it as 'the sweat of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air.' It is, however, a by-product, perhaps manufactured within the aphid from the juices of the plant on which it preys, or very probably an excretion, if not even a mere overflow, of surplus undigested glucose. The secretion oozes out from the honey-tubes above referred to, but similar products have also been observed to issue from the anus. Ants and other insects greedily hunt for this luxury, and the latter have been seen tickling the aphides to induce secretion. They also tend, protect, and imprison these valuable sources of sweetness, which Linnaeus long since expressively called their 'cows' (see ANT). Besides injuring or killing plants by preying upon their juices, the aphides produce abnormal growths and Galls (q.v.). These are often of considerable size, and sometimes exhibit a protective mimicry of fruits. They serve as the homes or cradles of the parasites. The reproductive relations have been for long noted on account of the

prevalence of Parthenogenesis (q.v.), or reproduction without fertilisation. At the end of autumn both male and female forms may be observed; and the fertilised eggs deposited in some safe place are hatched in spring, and give rise to female parthenogenetic forms, which are usually winged, and produce their young alive. Throughout summer there is a constant succession of parthenogenetic, viviparous females, and the number of generations appears to be limited only by temperature and food-supply. The return of autumn, however, means of course lowered temperature and scarcity of food, and these conditions are associated with the production of males. These fertilise the females, which are at this stage wingless, and the winter eggs are then laid. It appears that males may sometimes occur along with the viviparous forms, and that the latter may perhaps occasionally hibernate; but it is nevertheless demonstrable that warm weather and abundant food are conditions which result in the production of parthenogenetic females, while scarcity of food and cold weather cause the reappearance of males, and consequent sexual reproduction. Thus Réaumur succeeded in rearing above fifty parthenogenetic generations, all descended from one mother, by keeping up, for three or four years, an artificial summer. The experiment has been often repeated, and the viviparous parthenogenesis retained for even longer periods. The viviparous females are

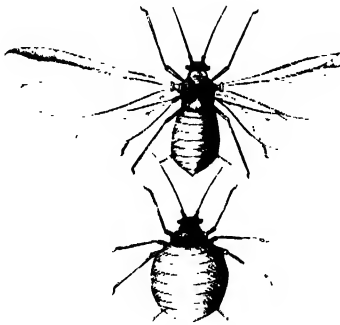


Fig. 1.—*Aphis padi*. (After Kessler.)

The figure presents equally well, 1, the autumn forms, the sexual male and the wingless female, the parents of the spring brood; 2, winged and wingless viviparous parthenogenetic forms occurring in spring; and 3, an autumn winged female appearing after a succession of wingless forms.

frequently equipped with wings, which are generally absent in the egg-laying forms. They differ in other respects, but especially in the simplified structure of the reproductive organs, from which the young are developed by a process comparable to internal budding. So, too, the early spring forms, arising from fertilised eggs, resemble their sexual parents, and differ markedly from their parthenogenetic progeny. The eggs of aphides develop into active six-footed larvae, which moult several times (see METAMORPHOSIS), and give rise to six-footed pupae, which finally become 'crago'.

It is quite impossible to give in figures any idea of the prolific increase of these luxurious parasites. Even during its short lifetime an aphid may have a progeny computable only in billions. A scene may be born in as many hours, and these become in a few days the founders of new families. From a form producing only one per day, a population of not less than the fifteenth power of 210 would be the result at the end of 300 days, while an even more moderate computation given by Huxley

shows that the tenth brood alone would weigh more than 500 millions of stout men. The increase is continually checked, how-

ever, by storms and sudden changes of weather, and also by the voracity of birds and insects. Some insects regularly feed upon aphides, while others deposit their ova in their living bodies (see ICHNEUMON), and thus utilise them as living cradles for their young, which, in such cases, are literally born out of death. Favouring circumstances sometimes lead to the appearance of extraordinary swarms of aphides, which have been noted in local histories as 'darkening the sun,' and have left a more permanent mark in the destruction of certain crops. In this connection the tiny plant-lice are of some economic importance.

Apart from the vine insect *Phylloxera* (q.v.), which does so much damage in the vineyards of the Continent and North America, the aphides of turnip, cabbage, potato, bean, apple, pear, larch, &c. have frequently been the cause of widespread loss. The price of hops varies from one year to another very much according to the prevalence of the 'fly.' For the last hundred and fifty years aphides have been unremittingly studied. Their life-history was first precisely investigated by Réaumur and Bonnet, and

many of the most noted naturalists have continued their researches. The reader is referred to G. B. Buckton's Ray Society Monograph on British Aphides (4 vols. 1876); and Miss Ormerod's work on *Injurious Insects* ought to be consulted for practical purposes.

Aphonia. This term is applied to loss of voice from whatever cause arising. Normally, the production of the voice is due to (1) the tension of the vocal chords, and (2) respiratory effort. Loss of voice may therefore depend upon (1) laryngeal disease or (2), deficient respiratory power. The morbid conditions of the larynx may be either functional as in hysterical aphonia or organic, when the lesion is either situated in the larynx, or due to an affection of the laryngeal nerves or nerve centres. See LARYNX. The vocal chords themselves may be more or less destroyed, and yet a certain amount of vocal power remain, because it sometimes happens that the false chords come together, and when they are caused to vibrate by the passage of air, produce a harsh, but distinct voice. Loss of voice may also—as could be inferred from what has just been stated—arise from diseases of the respiratory organs or general weakness. The treatment must of course depend upon the morbid condition which causes loss of voice, and can only be determined in each case after careful examination with the laryngoscope.

Aphorism (Gr.), a principle expressed tersely in a few words, or a short and pithy sentence conveying a general truth; such as, 'Use is second

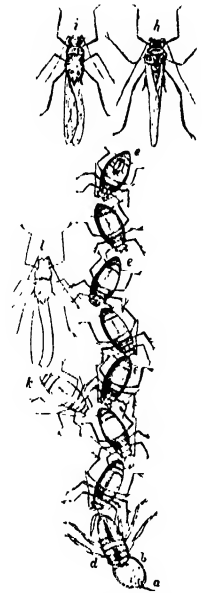


Fig. 2.—Owen's figure, showing life-history of *Aphis*:

a, the first spring form developing from fertilised ovum; *c*, the succession of parthenogenetic viviparous forms; *h* and *i*, the reappearance of sexual individuals, male and female, in autumn; *k* and *l*, the appearance of sexual forms at an earlier date.

nature.' A whole work is sometimes written in the form of a series of aphorisms, arranged in due order, and leaving their connection to be traced by the reader's reflection. Occasionally impressive, this style is more often wearisome. The name was first used in the *Aphorisms* of Hippocrates.

Aphrodite, one of the chief divinities of the Greeks, the goddess of love and beauty, so called because she was sprung from the foam (*aphros*) of the sea. She was the wife of Hephestus, but she loved besides, among gods, Ares and Dionysus, and among mortals, Anchises and Adonis. The chief places of her worship in Greece were Cyprus and Cythera. Aphrodite not only surpassed all other goddesses in beauty, but she had the power of granting irresistible beauty and attractiveness to others, especially to wearers of her magic girdle. The sparrow, the dove, and the swan were sacred to her, as also the myrtle, the rose, and the poppy. In the later poems, Eros is her son and her constant companion. Only such sacrifices as flowers and incense were made to Aphrodite. In earlier times the patroness of marriage and maternity, she became later the ideal of graceful womanhood, and was spiritualised by Plato as *Aphrodite Urania*. By others she was degraded in *Aphrodite Pandemos* to be the patroness of mere sensual love. Mysteries of an impure kind formed part of the ceremonial of the *aphrodisia*, or festivals held in her honour. The worship of Aphrodite was undoubtedly of Eastern origin, and she was originally a symbol of the fructifying powers of nature. Her cult was introduced by the Phœnicians into Cyprus, and soon spread over all Greece. She was originally identical with Astarte, the Ashtoreth of the Hebrews. By the Romans she was identified with Venus, hitherto one of the least important Roman divinities (see VENUS). Aphrodite has had the most important place in the history of art as the Greek ideal of feminine grace and beauty. Her most famous statue in antiquity was that of Praxiteles at Cnidus; her most famous picture, the *Aphrodite Anadyomene* of Apelles. The finest statues of the goddess that still exist are those of Melos (Milo) at Paris, of Capua at Naples, and of the Medici at Florence.

Aphthæ are small whitish ulcers, usually commencing as vesicles, on the surface of a mucous membrane. The whitish substance generally contains large quantities of a minute fungus, *Oidium albicans*. They are painful, and may be extremely so. The most common site of aphthæ is the mucous membrane of the lips and mouth, but they occasionally appear wherever mucous membrane approaches the skin.

Infants are liable to an aphthous eruption termed *Thrush* (q.v.). Aphthæ in adults are generally a consequence of fevers and other diseases, or a symptom of disturbance of the digestive system. In some cases of pulmonary consumption, they form a painful addition to the patient's sufferings. In ordinary cases of aphthæ, a preparation of borax, or some antiseptic wash, generally effects a rapid cure. Where the pain is severe, a simple application of solid nitrate of silver is the best remedy.

Apia'cææ. See UMBELLIFERE.

A piace're. See AD LIBITUM.

Apiary. See BEE.

Apicius, MARCUS GABIUS, a Roman epicure, who lived in the times of Augustus and Tiberius, and was celebrated for his luxurious table and his acquirements in the art of cookery. It is said that when he had spent £800,000 upon his appetite, and had only some £80,000 left, he poisoned himself in order to avoid the misery of plain diet. Two other gourmands—one a contemporary of

Sulla, the other of Trajan—bore the name Apicius. The Roman cookery-book, *Celii Apicii de Opsoniis et Condimentis, sive de Re Culinaris, Libri decem*, ascribed to Apicius, must belong to a much later time, inasmuch as it abounds in inaccuracies and solecisms. Its author thought proper to recommend his work to gourmands by affixing to it the celebrated name of Apicius.

Apion, a Greek grammarian, was born at Oasis in Libya, but educated in Alexandria, which he affected to consider his birthplace, from a wish to be thought a pure Greek. Settling at Rome about 30 A.D., he became famous as a teacher of rhetoric. He seems to have been as remarkable for his loquacious vanity as for his knowledge and real oratorical power. From his ostentatious disputations Tiberius used to call him *Cymbalum Mundi* ('the cymbal of the universe'). With the exception of one or two fragments, the whole of Apion's numerous writings are lost. These included a work on the text of Homer; a work on Egypt, which contained the far-famed story of 'Androclus and the Lion,' preserved by Aulus Gellius; a work against the Jews, to which Josephus replied in his work *Against Apion*; and one in praise of Alexander the Great.

Apios, a North American plant of the pea order (Leguminosæ), with tuberosous, starchy, edible rhizomes. Attention was specially directed to it by the French traveller Lamare-Picquot, but attempts at cultivation have not been to any practical extent successful.

Apis, the bull worshipped by the ancient Egyptians, who regarded it as a symbol and incarnation of Osiris, the husband of Isis, and next to Râ, the great divinity of Egypt. A sacred court or yard was set apart for the residence of Apis in the temple of Ptah at Memphis, where a numerous retinue of priests waited upon him, and sacrifices of red oxen were offered to him. His movements, choice of places, and changes of appetite were religiously regarded as oracles. It was an understood law that Apis must not live longer than twenty-five years. When he attained this age he was secretly put to death, and buried by the priests in a sacred well, the popular belief being that he cast himself into the water. If, however, he died a natural death, his body was solemnly interred in the Temple of Serapis at Memphis, and bacchanalian festivals were held to celebrate the inauguration of a new bull as Apis. As soon as a suitable animal was found having the required marks—black colour with a white square on the brow; the figure of an eagle on the back, and a black knot in the shape of a cantharus under the tongue (*scorabeus*)—he was led in triumphal procession to Nilopolis at the time of the new moon, where he remained forty days, and was afterwards conveyed in a splendid vessel to Memphis. The worship of the golden calf by the Israelites in the wilderness, and also the employment of golden calves as symbols of the deity by Jeroboam, have been very generally referred to the Egyptian worship of Apis.

Apis, Apidæ. See BEE.

Apium. See CELERY.

Aploodon, the name of a small rodent animal; better written Haplodon (q.v.) or Sewellel.

Apnoea, an abnormal state of the animal organism during which there is a complete cessation of breathing. It is brought about by too vigorous artificial respiration, as the result of which the blood contains more than the normal quantity of oxygen, and the respiratory nervous centre which controls the breathing is unstimulated and in a state of complete rest. See RESPIRATION.

Apoc'alyptse. See REVELATION OF ST JOHN.

Apocalyp'tic Number is the mystical number 666, spoken of in the Book of Revelation (xiii. 18). Among the Greeks and Hebrews the letters of the alphabet were used to denote numbers. Hence such letters must be taken as will, when used as numbers, make up 666 (either in the Greek or Hebrew alphabet) as the letters of the name in question. The best solution of the riddle is 'Neron Kesar,' the Hebrew form of the Latin 'Nero Caesar.' The vowels *e* and *a* are not expressed in the ancient Hebrew writing. The number represented by NERON KESAR would be 666, thus:

$$\begin{array}{ccccccc} \text{N} & \text{R} & \text{O} & \text{N} & \text{K} & \text{S} & \text{R} \\ 50 & + & 200 & + & 6 & + & 50 & + & 100 & + & 60 & + & 200 & = & 666. \end{array}$$

Other interpretations were adopted in early times, as *Antichrist* and *Lolaius*, the latter being supposed to refer to the Roman empire, and even in more recent times being explained by Protestant controversialists of greater zeal than discretion, as a prophetic allusion to papal Rome. See ANTI-CHRIST.

Apocalyptic Writings are such as, like the prophecies of Daniel, their prototype, set forth in a figurative and pictorial manner the future progress and completion of the world's history, especially in its religious aspects. The two apocalyptic books received into the canon of Scripture are the books of Daniel and the Apocalypse specially so called, the Revelation of St John. But Jewish and early Christian literature produced numerous apocalypses from about 170 B.C. to 130 A.D. Most of them were attributed to famous men of old by their authors. They deal largely with the increasing troubles and trial of God's people, and their final redemption and salvation by God's mighty works or Christ's special appearance again. The Book of Enoch (q.v.) is the best known of the non-canonical Jewish apocalypses; it dates from the later Maccabean period; another is the apocalypse of Ezra. The Shepherd of Hermas (q.v.) is the most important Christian work of this kind. See Hilgenfeld, *Die Jüdische Apokalyptik* (Jena, 1857).

Apocarpous Fruits, in Botany, are those fruits which are the produce of a single flower, and are formed of only one carpel, or of a number of carpels remaining free and separate from each other. The term is derived from the Greek *apo*, implying separation, and *carpos*, fruit.

Apocatas'tasis, in Theology, the final restitution of all things, when at the appearance of the Messiah the kingdom of God shall be extended over the whole earth (Acts, iii. 21). In a dogmatic sense, the name is applied to the future conversion of all men to the faith of Christ, and their consequent admission to everlasting blessedness. This idea was extended by Origen to imply the final conversion and salvation of all individuals, even the devil and his followers not excepted. Origen's belief was held also by Didymus of Alexandria, Gregory Nazianzen, Diodorus of Tarsus, and Theodorus of Mopsuestia, but was emphatically condemned as heretical by the orthodox. Yet it has often appeared since, as in Scotus Erigena in the 9th century, and in the 19th century in the so-called 'mediation theology' (*Vermitte-lungs-theologie*).

Apocrenic Acid (Humic Acid, Umic Acid) is one of the products of the natural decay of wood or other plant textures, and is found where woody fibre is decomposing in soils. It is soluble in water, and is an intermediate step in the assimilation by living plants of dead vegetable matter.

Apoc'rypha (a Greek word meaning 'hidden,' 'secret') seems, when applied to religious books or writings, to have been used (1) for such as were **suitable**, not for the mass of believers, but for the

initiated only; works containing the esoteric or recondite teaching of the faith or sect; (2) works the date, origin, and authorship of which were unknown or doubtful; (3) works which claimed to be what they were not, were spurious or pseudographic. When the Apocrypha is spoken of, the Apocrypha of the Old Testament is generally meant. Another large group may be called the apocryphal books of the New Testament.

The Apocrypha of the Old Testament is the fourteen books, or parts of books, which are found in the Septuagint or Greek version of the Old Testament, but are not in the Hebrew or Palestinian canon. The Palestinian Jews recognised only the Law, the Prophets, and such Hagiographa or sacred writings as were held to have been composed before the succession of prophets had ceased. The Septuagint, translated from the Hebrew at various dates, ultimately included a number of admittedly later works, some of them originally composed, not in Hebrew, but in Greek, whose relation to the old canon was not very precisely defined. These books are: (1) First (or Third) Esdras; (2) Second (or Fourth) Esdras; (3) Tobit; (4) Judith; (5) The parts of Esther not found in Hebrew or Chaldee; (6) The Wisdom of Solomon; (7) The Wisdom of Jesus, the son of Sirach, or Ecclesiastius; (8) Baruch; (9) The Song of the Three Holy Children; (10) The History of Susanna; (11) Bel and the Dragon; (12) The Prayer of Manasses, king of Judah; (13) First Maccabees; (14) Second Maccabees. The more important of these are treated in separate articles. They differ much in character and value. Some show manifest traces of Persian influence; others are mainly Palestinian in origin and spirit; others seem to have been written in Egypt, and reflect Greek or Alexandrian modes of thought. They date mainly from the 1st and 2d centuries B.C., and fall into three groups—historical or legendary, prophetic, and didactic or philosophical. Various as they are, the Apocrypha of the Old Testament are invaluable to the careful student of biblical literature and biblical theology. Though manifestly inferior to the canonical books in religious power and literary form, they almost everywhere reflect the current religious views of the Jews at the time of Christ's coming, the marvellous continuity of Jewish national feeling, unbroken faith in times of feebleness and trouble, and unconquerable hope in a noble and more glorious future. Theologically, they mark, in some ways, a development from the old Jewish standpoint, and a distinct approximation to the thought of the New Testament—in the doctrine of Wisdom, for example, which sometimes seems the personification of the Spirit of God, sometimes comes very near the *Logos*, the Messiah of the New Testament. The angelology also is nearer that of the New Testament than the Old. Prayer for the dead is sanctioned by 2 Maccabees xii.

The early Greek fathers, using the Septuagint, treated the apocryphal books very much as they did the canonical books; but from the Council of Laodicea (360 A.D.) onwards, the Greek Church had never given the 'ecclesiastical' books (as the Apocrypha came to be called) the same rank as the canonical ones. In the Western Church, Jerome and others recognised only the Palestinian canon; but Augustine gave the weight of his authority to the opposite view. While, in the middle ages, the 'ecclesiastical' books were perhaps most usually distinguished in some measure from the canonical Scriptures in authority, the Council of Trent took Augustine's view, and anathematised those who do not accept the Apocrypha contained in the Vulgate (omitting 1st and 2d Esdras, and the Prayer of Manasses) 'as sacred and canonical.' Luther held them 'not

equal to Holy Scripture, but as good and useful for reading.' The Reformed Church generally emphasised this distinction. The articles of the Church of England declare that they are to be read 'for example of life and instruction of manners,' but not 'to establish any doctrine;' but many of the parts of the Apocrypha read as lessons were excluded from the lectionary sanctioned in 1871. The Westminster Confession, and most of the non-Anglican churches in Britain and the United States, regard them as 'of no authority,' 'nor to be any otherwise approved or made use of than other human writings.' A bitter controversy in Scotland, in 1825-27, as well as in England, led to the omission of the Apocrypha from the Bibles circulated by the British and Foreign Bible Society; and the quotation from Wisdom iv. 13, 14, on the memorial to Prince Albert at Balmoral in 1862 revived debate on the subject. Many good people regard the Apocrypha, not with indifference, but with antipathy, as books that falsely claim to be part of the inspired Word of God.

Besides those actually included in the Septuagint, there were numerous Jewish apocryphal works, notably the Book of Enoch and others usually called Apocryptic Writings (q.v.), the Psalms of Solomon, the Book of Jubilees, and others.

The apocryphal books of the New Testament stand on a different footing; no considerable part of the Christian Church has included any of them in the canon, and most of them have been always explicitly rejected as without authority, or as fabulous. But the name has been used of very different works. Thus the First Epistle of Clement is found in the Codex Alexandrinus, and is quoted by some of the fathers as Scripture; the Shepherd of Hermas, the Martyrdom of Polycarp, and the Epistle of Barnabas, for a time received like honour from early Christian writers (see APOSTOLIC FATHERS, and the articles on these several books). The gospel according to the Hebrews (also called gospel of the Nazarenes, and gospel according to the Apostles) was the gospel of the Ebionite Christians. This is lost; and we know little but the names of the gospels used by Marcion (probably a form of Luke's gospel) and Basilides, the gospels according to the Egyptians, to Thomas, to Matthias, to Bartholomew; or of the Acts of Peter and of Paul, the Preaching of Peter, the Revelation of Peter; and other works named by Eusebius, Origen, and others. Another group of apocryphal works has actually come down to us, and was at one time widely read. More than one of them are gospels of the infancy of Christ, and tell marvels of his boyhood. To these belong the Protevangelium of James, and the gospel of Thomas. The Gesta Pilati, and others, deal with Christ's death. Tischendorf has edited the several apocryphal gospels, Acts, Epistles, and Apocalypses that have been preserved; see translations by Cowper (1874), and by Walker (in Clark's *Ante-Nicene Library*, vol. xvi.). The other fragments of gospels have been edited by Hilgenfeld. For the Old Testament Apocrypha, see the edition with a commentary by Ware (2 vols., uniform with the *Speaker's Commentary*), and that by Churton. See also the Introductions to the Old and New Testament generally. A middle position between the New Testament Apocrypha and the canon was long held by the Antilegomena of the New Testament, whose claims to authority were long disputed in the early church, though they were ultimately everywhere accepted as canonical. These were the books of 2 Peter, 2 and 3 John, the Epistles of James and Jude, Hebrews, and Revelation of St John. See Lipsius, *Die Apokryphischen Apostelgeschichten und Apostellegenden* (1883); and the article BIBLE.

Apocynaceæ, or APOCYNÉE, a natural order of corollifloral Dicotyledons, chiefly tropical shrubs and trees, but represented in Britain by the Periwinkle (q.v.), and in South Europe by the Oleander (q.v.). The milky juice is usually poisonous, but sometimes drinkable (see COW-TREE). It is a frequent source of Caoutchouc (q.v.). Some yield indigo, and a few (Carissa, Haecornia) bear edible fruits; but the majority are poisonous, notably the Tangle (Tanglethorn), or ordeal-seed of Madagascar. Canadian hemp (*Apocynum cannabinum*) yields a strong fibre, long known to the Indians. Some Apocynaceæ are cultivated as hot-house plants, especially *Allamanda*.

Apodictic (from the Greek verb 'to prove'), a logical term signifying a judgment or conclusion which is necessarily true; or, in other words, a judgment of which the opposite is impossible. No apodictic judgment can be founded on experience.

Apogamy. See FERN, REPRODUCTION.

Ap'ogee (Gr. *apo*, 'from,' and *gē*, 'the earth'), properly speaking, the greatest distance of the earth from any of the heavenly bodies. Its application, however, is restricted to the sun and moon, the sun's apogee corresponding to the earth's aphelion, and the moon's apogee being the point of its orbit most remote from the earth. Apogee is opposed to perigee.

Apolda, a town of Saxe-Weimar, 9½ miles NE. of Weimar by rail. It is a place of much industrial activity, having extensive manufactures of hosiery, which are amongst the most important in Germany. They employ about 7000 workers, men and women, in and about the town. There are also dyeworks, machine-works, and bell-foundries. Pop. (1867) 8882; (1885) 18,061.

Apollinaris the Younger, Bishop of Laodicea in Syria (died 390 A.D.), and one of the warmest opponents of Arianism. His father, Apollinaris the Elder, who was presbyter of Laodicea, was born at Alexandria, and taught grammar, first at Berytus, and afterwards at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavoured to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; whilst the New Testament formed the groundwork of dialogues in imitation of Plato. But it was chiefly as a controversial theologian, and as the founder of a sect, that Apollinaris is celebrated. He maintained the doctrine that the *Logos*, or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualised and glorified form of humanity. This doctrine was condemned by several synods, especially by the Council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread itself rapidly in Syria and the neighbouring countries, and, after the death of Apollinaris, divided itself into two sects—the Vitalians, named after Vitalis, Bishop of Antioch; and the Polemicians, who added to the doctrine of Apollinaris the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration.—Apollinaris must not be confounded with Claudius Apollinaris, Bishop of Hierapolis, in Phrygia (170 A.D.), who wrote an *Apology* for the Christian faith, and several other works, all of which are lost.

Apollinaris Water, an alkaline mineral water containing carbonate of soda, derived from

the Apollinaris Spring in the valley of the Ahr, in the Rhine province. It is rich in carbonic acid, and is popular for table use.

Apollo (Gr. *Apollon*) may be regarded as the characteristic divinity of the Greeks, inasmuch as he was the impersonation of Greek life in its most beautiful form, and the ideal representative of the Greek nation. His mild worship, with its many festivals, accompanied as they were by a cessation from all hostilities; his various shrines at sacred places, with their oracles; and the general idea of his character, had a wide, powerful, and beneficent influence on social and political life throughout the states of Greece. Homer and Hesiod mention that he was the son of Zeus and Leto, and twin-brother of Artemis, but neither states where he was born. The Ephesians believed that he was born in a grove near their city. The most popular legend was that which made him a native of Delos, one of the Cyclades, where his mother Leto, followed by the jealous wrath of Hera over land and sea, at length found rest and shelter, and was delivered of him, under the shadow of a palm or olive tree, at the foot of Mount Cynthus. To spite Hera, who was far from being a favourite with the other goddesses, these hastened to tender their services to the weak and wearied Leto. Themis fed the young Apollo with nectar and ambrosia, the food of the gods, which seems to have suddenly excited the self-consciousness of the infant deity, as he surprised his nurse by starting to his feet, demanding a lyre, and announcing his intention of henceforth revealing to mortals the will of Zeus. The island, proud of having been the birthplace of the god, adorned itself with a robe of golden flowers.

In ancient literature Apollo is described as possessed of many and various powers, all of which, however, appear to be intimately related to each other. He is spoken of: (1) As the god of retributive justice, who, armed with bow and arrows, sends down his glittering shafts upon insolent offenders. In this character he appears in the opening of the *Iliad*. (2) As the instructor of bards, and the god of song or minstrelsy, playing upon the phorminx or seven-stringed lyre, and singing for the diversion of the other deities when engaged in feasting. (3) As the god of prophetic inspiration, especially in his oracle at Delphi. (4) As the guardian deity of herds and flocks, as in his care of the flocks of King Admetus at Phere in Thessaly. (5) As the god of medicine, who affords help, and wards off evil. In this sense he is represented as the father of Aesclepius (Esculapius), the god of the healing art. (6) As a founder of cities, and the spiritual leader of colonists. According to Homer, he assisted in building the walls of Troy. Cyrene, Naxos in Sicily, and other cities, venerated him as their founder. By the later writers he was identified with Helios, the sun-god, though Homer describes the latter as a distinct deity. Several critics, however, have regarded Helios, or the sun-god, as the true original Apollo—an opinion supported by many probabilities. In the Greek mythology, Apollo forms with the supreme Zeus and Athena a kind of divine triad. He is the beloved son of Zeus, the revealer of his counsel, one in mind and will with him.

The predominance of his worship, carried with him by the wide-spreading Greek colonies, who were under his peculiar care, marks a higher stage in the development of Greek religion, by which a limit was put to the polytheistic idea, and the ethi- cal took the place of the merely physical. Apollo could only be approached with a pure heart, and self-examination was the first condition of his discipleship. It was from the Eleans that his worship came to Greece, and it was by them first that the lofty ideal of the humanisation of deity

was conceived. His worship touched the glowing imagination of the Greek, and thus in Apollo, the saviour and purifier, the guide to self-control without self-mortification, Greek religion may be said to have reached the climax of its development. His oracle at Delphi inculcated a really high standard of religious life for three hundred years, and it was not till about the end of the 6th century B.C. that it began to decline. It is significant that it was the Apollo worship that won the heartiest homage of Socrates. It was to the Greek art and philosophy that it owed its development into the ideal of humanity, and it ever constituted the brightest side of the Greek mind. The most celebrated oracles of Apollo were at Delphi, Abae in Phocis, Ismenion in Thebes, Delos, Claros near Colophon, and Patara in Lycia. One of the most common epithets for Apollo is *Phoebus* ('the bright' or 'pure'), which occurs in Homer, and later was applied to Apollo more particularly as the sun-god. Another was *Smintheus*, most probably from *sminthos*, a mouse, there being a statue of the god at Chryse with a mouse under its foot, while on coins he frequently carries a mouse in his hands (see Lang's *Custom and Myth*). Among the Romans, the worship of Apollo was practised as early as 430 B.C., and prevailed especially under the emperors. But there can be no doubt that the Romans derived their conceptions of Apollo entirely from the Greeks. It was in honour of him and his sister Diana (Artemis) that the *ludi saeculares* were celebrated every hundred years. The attributes of Apollo are the bow and quiver, the cithara and plectrum, the snake, raven, shepherd's crook, tripod, and laurel; less frequently, the grasshopper, cock, hawk, wolf, and olive-tree.

In sculpture, he is generally represented with a face beautifully oval, high forehead, flowing hair, and slender figure. The most famous representation of the god is the Apollo Belvedere at Rome, a figure in which are combined the highest intellect



Apollo Belvedere.

with the most consummate physical beauty. It is supposed to be a copy of a bronze votive statue erected at Delphi, and representing the god repelling the Gauls (279 B.C.) from his shrine. From another copy, a bronze statuette at St Petersburg, known as the Stroganof Apollo, it is found to have been an *agis*, not a bow, that the figure held in the left hand. The statue (upwards of 7 feet high) is naked, but a cloak fastened round the neck hangs gracefully over the extended left arm; the expression of the face is one of calm and godlike triumph, mixed with 'beautiful disdain.'

This great work of art was discovered in 1495 amid the ruins of ancient Antium, and purchased by Pope Julius II., who placed it in the Belvedere of the Vatican, whence the name it bears. The left hand and the right fore arm, wanting in the statue as discovered, were restored by a pupil of Michael Angelo.

Apollodorus, (1) an Athenian painter, who flourished about 408 B.C., and was the predecessor of Zeuxis. He introduced improved colouring and distribution of light and shade.--(2) An Athenian grammarian who flourished about 140 B.C., wrote a work on mythology, giving an arrangement of old myths from the earliest times to the historical period; also a geography, a chronicle in iambic verse, and several grammatical works. The account of the mythology and the heroic gods of Greece, known as the *Bibliotheca*, is the only work preserved (except a few fragments). It is a valuable work, but is reckoned by some only a later extract from a larger work by Apollodorus. A late edition is Hercher's (Berl. 1874). (3) Another Apollodorus was a celebrated architect in the time of the Emperor Trajan, by whom he was employed to construct a bridge over the Danube in Lower Hungary. He was sentenced to death in 129 A.D. by Hadrian, offended at his fearless criticism of a temple designed by the emperor himself.

Apollonius. (1) APOLLONIUS OF RHODES (born in Alexandria about 240 B.C., but long resident in Rhodes) wrote many works on grammar, and an epic poem entitled the *Argonautica*, marked rather by learning and industry than by poetical genius, though it contains some truly artistic passages, such as those exhibiting the growth of Medea's love. It was greatly admired by the Romans, was translated into Latin by Publius Terentius Varro, and was imitated in a wholesale manner by Valerius Flaccus. There are editions by Merkel (1854) and Seaton (1888). (2) APOLLONIUS OF PERGÆ, who flourished 250-220 B.C., is classed with Euclid, Archimedes, and Diophantus, among the founders of the mathematical sciences. His work on conic sections has been preserved, partly in the original Greek, partly in an Arabic translation. He not merely summed up all that was then known on the subject, but made many valuable discoveries. (3) APOLLONIUS OF TYANA in Cappadocia, born three or four years before the Christian era, was, according to Philostratus, a zealous teacher of the neo-Pythagorean doctrines, who claimed a commission from heaven to teach a pure and reformed religion. He soon collected a considerable number of disciples, travelled through a great part of Asia Minor, and ultimately made his way to India, in order to become acquainted with the doctrine of the Brahmins. On this journey he stayed for a time in Babylon, was introduced to the Magi, and at last reaching the court of King Phraortes, in India, made the acquaintance of the most notable Brahmins. When he returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity, rather than the power of working miracles. He was patronised by Vespasian, and followed him to Egypt. After extensive travels in Spain, Italy, and Greece, he was accused of having conspired with Nerva against Domitian. Ultimately, he appears to have settled in Ephesus, where he opened a neo-Pythagorean school, and continued his teaching until he died, nearly one hundred years old. His history was not written till more than a hundred years after his death, by Philostratus (q.v.). It contains a mass of absurd-

ities and fables, through which an outline of historical facts and the real character of the man are perhaps discernible. After his death, he was worshipped with divine honours, temples were built to him, coins struck in memory of him. The notorious English freethinker Blount, and Voltaire, wrote to prove the similarity or superiority of Apollonius to Christ. Baur's theory is, that Philostratus invented most of the story of Apollonius as a heathen saviour, simply to be a counterpart and rival to Christ. See Froude's *Short Studies* (vol. iv.); and the work by Pettersch (Berl. 1879).--(4) APOLLONIUS, surnamed DYSKOLOS (or 'ill-tempered'), of Alexandria, lived in the 2d century. Some of his grammatical works were edited by Bekker. He was the first who reduced grammar to a system. His reputation was so high, that Priscian calls him *grammaticorum princeps* (the prince of grammarians), and follows him somewhat closely.

Apollonius of TYRE, the hero of a Greek metrical romance, very popular in the middle ages. It relates the romantic adventures of Apollonius, a Syrian prince, as well as those of his wife who was parted from him by apparent death, and his daughter, and closes with the happy reunion of the whole family. The original no longer exists; but there are three very early Latin versions, of which one was published by Welser (Augsburg, 1595); another is to be found in the *Gesta Romanorum*; and the third in the *Pantheon* of Gottfried of Viterbo. From this Latin source have proceeded the Anglo-Saxon version of the 11th century (ed. by Thorpe, 1834), the Spanish version of the 13th century, and several French and Italian versions in prose and verse of the 14th and 15th centuries. Shakespeare treated the subject in his drama of *Pericles*, mainly following the version of Gower in his *Confessio Amantis*, itself based on the *Pantheon* of Gottfried of Viterbo. The romance was rendered into German, probably from the *Gesta Romanorum*, by a Vienna physician, 'Heinrich von der Neuenstadt,' about the year 1300, in a poem of 20,000 lines. A hitherto unknown Middle German prose version of the story was edited by Schöter in 1872. Smirck narrates the story as it is given in the *Gesta Romanorum*, in his *Quellen des Shakespeare* (Bonn, 1872). See Hagen, *Der Roman vom König Apollonius in seinen verschiedenen Bearbeitungen* (1878).

Apollo, an Alexandrian Jew, described in the Acts of the Apostles as an eloquent man, and mighty in the Scriptures, knowing only the baptism of John, who on coming to Ephesus (54 A.D.) was more perfectly taught by Aquila and Priscilla. He was a distinguished fellow-labourer of the apostle Paul; and in Corinth was especially successful as a Christian teacher, inasmuch that a party in the church called themselves by his name (1 Cor. iii. 4). By many he has been regarded as the author of the Epistle to the Hebrews.

Apollyon (Gr., 'the destroyer'), or ABADDON (Rev. ix. 11; cf. Job, xxvi. 6, xxxi. 12), the same as the Asmodeus of the Book of Tobit (iii. 8). See ASMODEUS. It is with Apollyon that Christian fights his hardest battle in the *Pilgrim's Progress*, and it is to this literary use of it by Bunyan that the name now mainly owes its currency.

Apologetics (a word derived from Gr. *apo*, 'from,' and *logos*, 'speech'--something *spoken* to ward off an attack) technically connotes that branch of theology which is concerned with the defence of Christianity. It is not to be confounded with *polemics*, which is occupied with the defence of the peculiar doctrines of parties *within* the Christian pale. A work has come down to us, written by Xenophon, entitled the *Apology of Socrates*, and

another, with the same title, by Plato. From these the Christian fathers adopted the term. As a distinct branch of theological science, apologetics cannot be dated further back than the 18th century. Isolated apologies, however, appeared from time to time, from the days of Justin Martyr (d. 168) downwards. Thus, as against the Ebionites and Gnostics (q.v.), were written Justin's two *Apologies* and his *Dialogues*. Against Celsus (q.v.), a philosopher of the 2d century, who, among other things, ascribed the paternity of Christ to a Roman soldier, Origen (q.v.) wrote. Porphyry, a philosopher of the 3d century, strove to reduce Christ to the level of the ancient philosophers of Greece. Against him, Eusebius of Cæsarea, Theodoret, and Augustine (q.v.) wrote. In the 4th century, the Emperor Julian, known as the Apostate, endeavoured to rehabilitate paganism in the place of Christianity. He was combated by Cyril of Alexandria, who wrote ten books against him. In medieval times, various apologetic works were written by Anselm of Canterbury (d. 1109); by Abelard (d. 1142); and by Thomas Aquinas, the *doctor angelicus* (d. 1274).

As a distinct branch of systematic theology, apologetics is treated under two great heads—viz. Natural Theology and Revealed Theology. Proceeding upon the former of these lines, and confining himself entirely to the light of nature, the apologist endeavours to prove the existence of God, and the possibility of knowing Him. He then goes on to prove the existence of the human soul, and the doctrine of a future life. In working out the theistic argument, two methods are adopted—viz. the ontological, or *a priori*, which reasons from cause to effect, from self-evident principles prior, in logical order, to experience, to their application; and the teleological, or *a posteriori*, which, reversing the former process, reasons from effect to cause, from observed facts to a general principle. The *a priori* argument has been variously set forth by Anselm, Descartes, Dr S. Clarke, Cousin, Ferrier, and Gillespie; and the *a posteriori* by a host of writers, among whom may be named Paley, *Natural Theology*; Chalmers, Kidd, Bell, Buckland, &c. in the *Bridgewater Treatises*; Flint, *Divine Lectures*; Conder, *The Basis of Faith*; Janet, *Final Causes*; and various Bampton lecturers. It is now generally admitted that these two arguments cannot be absolutely separated—something from experience enters into the *a priori* argument, and, *vice versa*, an *a priori* element enters into experience. When, however, we gather into a focus all the evidence furnished by causation, order, and intuition, the apologist maintains that the argument for theism is simply irrefragable. To the objection that though the existence of God may be thus proved, we cannot, owing to the relativity of our knowledge, in any true sense know Him, the apologist replies that He may be as truly known as any other object, by the contemplation of His attributes as disclosed in His works. The theist does not profess to comprehend the Infinite One; all that he asserts is that he is capable of truly apprehending Him. His knowledge, as far as it goes, is true knowledge.

The argument for the existence of the soul, and for a future state, is based on physiology, psychology, and moral government. It is ascertained that the closest scrutiny of man's physical organisation leads up to the conclusion that his loftiest endowments—self-consciousness, reason, and conscience—must inhere in a substance other than material. When, again, the data which consciousness furnishes are duly weighed, it is asserted that man's intellectual capacities, his intuitions, and his aspirations clearly intimate that his true environment is the infinite and the eternal. Special stress is laid upon the testimony of conscience.

Man's sense of moral responsibility, it is argued, shows that his present state of existence is manifestly one of discipline and probation. Such a state would, however, be utterly meaningless if, at death, he were to drop into non-existence. See, as against materialism, Lotze, *Microcosmus* (Eng. trans. 1886); and on the argument from moral government, Kant, *Metaphysics of Ethics*; see also Pascal, *Thoughts*; Butler, *The Analogy of Religion*; and the various writers on natural theology. Of works in which assaults on religion from the side of science are met by arguments from the physical sciences, we may mention Sir J. W. Dawson's *Origin of the World* (1877); and Professor Henry Drummond's *Natural Law in the Spiritual World* (1883; 67th thousand, 1887).

In defence of revealed theology, the apologist has been called upon to deal with a wide range of subjects. Since Lessing (q.v.) published the 'Wolfenbüttel Fragments' (now generally ascribed to H. S. Reimarus of Hamburg, who died 1768), that destructive criticism came into vogue which has found such advocates as Strauss and Renan, Kuenen and Wellhausen. Kant's famous *Critique of Pure Reason*, which denies to pure reason the power of making any certain statements concerning what is divine, gave an impetus to the rationalistic tendencies of the Deists (q.v.), the result of which is seen in modern agnosticism and positivism. Under these combined influences, the supernatural has come to be either denied, or ignored as unverifiable. The Bible, in particular, has been subjected to the severest criticism, with a view to the complete undermining of its authority as a witness for God and for a future life. Apologetics has therefore for its task in this field, to defend the canonicity, and to prove the inspiration and consequent trustworthiness of Sacred Scripture. On these topics, see Westcott, *History of the Canon of the New Testament*; Charteris, *Canonicity*; Lee, *The Inspiration of Holy Scripture*; and Ladd, *The Doctrine of Sacred Scripture*. There is a tendency in some quarters at present to distinguish the biblical writings into canonical and deuterocanonical (see Ladd, *ut supra*). As regards inspiration, the verbal theory is abandoned by most. Evangelical writers, however, still advocate a theory of plenary inspiration; but the theory, as held by them, does not usually exclude the possibility of 'circumstantial errors' occurring in Scripture (cf. Briggs, *Biblical Study*, p. 242). They also distinguish between inspiration and revelation; the current phrase being that the Bible is the record of divine revelation.

Modern apologists, however, do not place these topics in the foreground. Their main concern is to establish the moral perfection of the Christ of the gospels, and then the substantial historical character of the evangelical records. If the sinfulness of Christ is conceded, they maintain, with Origen, that 'He is the miracle of the world'—i.e. He is a moral miracle. In connection with the appearing of such a Being, they say that it is in the highest degree reasonable to look for manifestations of the supernatural in the physical sphere. The one physical miracle on which they are prepared to stake everything is the resurrection. In proof of this event, they push their historical investigations backwards, step by step, through the writings of the early fathers, and specially through the four epistles which the most adverse criticism ascribes to the apostle Paul, until they arrive at within twenty-seven years of the crucifixion. They are then in a position to show that the moral portraiture of Christ which appears in the canonical gospels was at that date extant, and that, moreover, Christian communities founded upon faith in the resurrection of Christ were to be met with from Jerusalem to

Rome. That a 'myth' could have established itself in so short a period, they maintain, is incredible; and as to a hallucination, such as the theory of 'visions' demands, having taken possession of such a multitude of otherwise rational and estimable people—this they regard as palpably absurd. If, then, the moral perfection of Christ and his resurrection are conceded, all is conceded. He was what he claimed to be—the Son of God. On the modern statement of the argument, see Liddon, *The Divinity of Jesus Christ* (1867); Bruce, *The Miraculous Element in the Gospels*; and specially Row, *A Manual of Christian Evidences* (1887). The apologetic works of Luthardt, Christlieb, and Godet are held in high estimation. See INSPIRATION, MIRACLES.

Apologue, a fable, parable, or short allegorical story, intended to serve as a pleasant vehicle for some moral doctrine. One of the best known apologues is that by Jotham, as given in the Book of Judges (ix. 7-15). Another is that of the 'Belly and the Members,' related by the patrician Menenius Agrippa, in the second book of Livy. The name is applied more particularly to a story in which the actors or speakers are animals or inanimate things. It is identical with the classical *fable*, though it may perhaps be somewhat more complex and sustained than is possible in this form. The New Testament *parable* is a simpler kind of apologue, the incidents of which are necessarily probable. Æsop's fables have enjoyed a world-wide reputation. Luther held such an opinion of the value of the apologue as a vehicle of moral truth, that he edited a revised Æsop, for which he wrote a characteristic preface.

Apomorphia is an alkaloid prepared from morphia by heating with hydrochloric acid. It is a rapid and powerful emetic, but its effects quickly pass off; and it causes very little depression. Its chief value depends upon the ease with which it can be administered by hypodermic injection (q.v.), as vomiting can thus be induced even when swallowing is difficult or impossible—e.g. in cases of poisoning.

Aponeurosis (Gr. *apo*, 'from,' and *neuron*, 'a string') is an anatomical term for an expansion of strong fibrous tissue, of which there are many examples in the human body. It is generally confined to expansions from the tendons of muscles, as the lumbar aponeurosis. If a tendon is very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered with a tendinous expansion, to which some of their fibres are attached. Aponeuroses stretch in some places as protections over large arteries.

Apophthegm, a terse, pithy saying, conveying some important truth in a few words. The apophthegm is more short, pointed, and practical than the Aphorism (q.v.) need be, and is intended to make a vivid impression on the hearer. Examples are—'God helps them that help themselves;' Dr Johnson's 'Patriotism is the last refuge of a scoundrel.' Apophthegm is also spelt APOPHLAGM.

Apoplexy (Gr. *apoplēxia*—from *plēssō*, 'I strike'—'disablement from a stroke'), a term used in medicine, from early times, of any sudden and unaccountable loss of consciousness, and still popularly employed in much the same way. It is generally applied, however, by modern medical writers to rupture of a blood-vessel, with hemorrhage in the brain or its membranes, whether with or without unconsciousness. This sense will be adhered to in the following description. Most unfortunately, it has also been used of hemorrhages into the tissue of any organ in the body—e.g. *pulmonary apoplexy*.

In consequence of these ambiguities, there is at present a tendency to abandon the word in favour of more precise terms.

Apoplexy is commonly a disease of advanced life, being very rarely met with below the age of forty. The most important causes which predispose to apoplexy are Atheroma and minute Aneurysms (q.v.) in the brain (see ARTERIES, *Diseases of*), and chronic Bright's Disease (q.v.). At one time much more importance was attached than now to a thick-set, short-necked habit of body in this connection. Men are more liable to apoplexy than women. A severe *apoplectic fit* or *shock* may come on suddenly or gradually; in either case the patient loses sensation, motion, and consciousness, and lies with flushed face, full slow pulse, and noisy 'stertorous' breathing. If death occur, a clot of blood may be found in the substance or upon the surface of the brain, with the ruptured artery from which it has escaped. If the shock be not fatal, the patient gradually recovers consciousness; and it is found then, if not before, that there is Paralysis (q.v.), partial or complete, of one side of the body. In the course of days or weeks this may pass off; but rarely disappears completely. Mental enfeeblement, as well as bodily, may result. Less severe shocks of apoplexy often occur, with no unconsciousness, but only paralysis, partial or complete, of one side of the body. The approach of apoplexy is often heralded by *premonitory symptoms*: e.g. temporary confusion of thought or loss of memory, giddiness, headache, difficulty of speech, weakness in a limb, double vision; and when these occur, prompt medical treatment, especially attention to regular action of the bowels, may occasionally avert the threatened apoplexy. When a shock of apoplexy has occurred, the patient must be kept lying perfectly quiet, with head raised, and cold applied to it. Medicines which tend to check hemorrhage, as ergot, should be administered. Purgatives may be given; and bleeding, especially from the temporal artery or external jugular vein, is sometimes valuable. Alcohol is dangerous, and should on no account be used unless by express direction of a medical man. A person who has had one shock of apoplexy is always liable to a recurrence.

Embolism of the cerebral arteries (see ARTERIES, *Diseases of*) closely resembles apoplexy; as do fits, called *apoplecticiform attacks*, met with in other brain diseases—e.g. tumours, general paralysis. The condition of a patient suffering from Epilepsy (q.v.), uræmia (see KIDNEYS, *Diseases of*), or narcotic poisoning—e.g. by opium or alcohol—may be very like that described as characteristic of apoplectic unconsciousness, and very difficult to distinguish from it. Hence the great importance of caution in dealing with a person found unconscious, lest he be treated, to his imminent peril, as merely drunk, when really suffering from severe apoplexy.

Heat Apoplexy is another name for Sunstroke (q.v.).

Apospory. See FERN, REPRODUCTION.

Apostate literally designates any one who changes his religion, whatever may be his motive; but, by custom, the word is always used in an injurious sense, as equivalent to one who, in changing his creed, is actuated by unworthy motives. In early Christian times, the word was applied to those who abandoned their faith in order to escape from persecution; but it was also applied to such as rejected Christianity on speculative grounds (the Emperor Julian, for instance). The apostates in times of persecution were styled variously *Sacrificati*, *Thurificati*, &c., according to the modes in which they publicly

the
vice versa.
the fortune-
tised. Th
history is that of Henry IV. (q.v.), who became
Roman Catholic for peace's sake.

A posteriori reasoning is reasoning from experience, or *backwards* from effect to cause. See **A PRIORI**.

Apostle (Gr. *apostolē*, 'one sent forth'), a messenger, but especial used to denote the twelve disciples whom Jesus sent forth to preach the gospel twelve probably because there were twelve tribes. Their names were Simon Peter, Andrew, John (the son of Zebedee), James (his brother), Philip, Bartholomew, Thomas, Matthew (identified with Levi), James (the son of Alphaeus), Thaddæus, Simon, and Judas Iscariot. (The lists in Matt. x., Mark iii., Luke vi., and Acts i., are the same, with the exception that for Thaddæus in Matthew and Mark, we have Judas in Luke and Acts.) Peter and Andrew and James and John have a certain pre-eminence; and Peter and the two sons of Zebedee enjoyed a special measure of their master's love and confidence. The apostles were mainly men of very humble rank, distinguished rather by their character and religious zeal, than by intellectual ability or special training. Subsequently, Matthias was chosen in the room of Judas; and still later, Paul was called to the apostleship. The apostles were twice commissioned to go forth on their work of evangelisation; first during the Galilean ministry, when their labours were restricted to the Jews. The second time was shortly before the Lord's ascension, when they were sent to 'teach all nations, baptising them in the name of the Father, and of the Son, and of the Holy Ghost.' On the day of Pentecost, the apostles received miraculous gifts. It has been held that it was as essential to their office that they should have seen the Lord (1 Cor. xv. 8); that they were inspired (John xvi. 13; Gal. i. 11, 12); and that they had the power of working miracles (2 Cor. xii. 12). Scripture tells nothing about the later life or labours of most of them, and there is no historical foundation for the tradition that the first apostles divided the then known world between them, and that all save St John died a martyr's death. Early tradition, however, connects Philip with Phrygia, Thomas with Parthia, Andrew with Scythia, Bartholomew with India. When controversy arose about the relation of the church to the heathen world, Paul (the apostle of the Gentiles), spoke of the 'see of Peter,' as 'the apostleship of the circumcision' (Gal. ii. 7-9). The church did not maintain the office of apostle in its ministry, though it has been contended that the office of the Bishop (q.v.) represents it. The see of Rome calls itself *apostolic*, as having been occupied by St Peter. The Catholic Apostolic Church has revived the title of apostle. It is usual to speak of the founder of the Christian Church in a country as the apostle of that country; thus, Gregory is the apostle of Armenia; Boniface, of the Germans; Augustine,

of the English; St Patrick, of Ireland; Columba, of the Scots; Cuthbert, of Northumbria; St Francis Xavier, of India; and, more recently, Eliot is spoken of as the apostle of the Indians.

Apostles. **TEACHING OF THE TWELVE**, is the title of a treatise discovered in 1883 by Bryennius, the metropolitan of Nicomedia, and published by him with a Greek commentary (Constantinople, 1883). In sixteen short chapters it describes the two ways of life and of death, the method of divine service, baptism, fasting, prayer, the eucharist, and the ministry in the early church. The ministers are distinguished as permanent or itinerant, bishops and deacons belonging to the former, and prophets and teachers to the latter class. It had previously been suggested that some such document must underlie the seventh book of the *Apostolic Constitutions* (q.v.); and there is certainly a very close connection between this and the eighth book and the treatise. The work is moral rather than dogmatical in tone, and is of great interest for the history of the early Christian Church; but it throws no fresh light on the New Testament canon, and does nothing to settle the Johannine origin of the fourth gospel. The writer borrows extensively from the *Epistle of Barnabas*, 119 A.D.; and Harnack accepts Taylor's view that the book, or at least the first part of it, is based on a Jewish manual called *The Two Ways*, introduced at a very early date into the Christian Church for the use of catechumens. The date of the treatise is uncertain; some scholars fix it at 80-100 A.D.; Harnack contends for 120-165; and one hostile critic places it after the *Constitutions*. English translations include those by Farrar, Spence, and Schaff; within five years of the publication of the original, as many as 200 treatises, books, and articles on it had appeared. Very valuable notes will be found in Harnack's *Lehre der zwölf Apostel* (1885); see also his *Apostelthum* (1887). The work is frequently referred to as the *Didache* (Gr., 'teaching'). In 1887 the Johns Hopkins University of Baltimore produced a fac-simile of the original.

Apostles' Creed. See **CREED**.

Apostle Spoons, silver spoons whose handles ended in figures of the apostles, a common baptismal present in the 16th and 17th centuries.

Apostolic, or **APOSTOLICAL**, the general term applied to everything derived directly from the apostles, or bearing their character. Either case constitutes apostolicity. The Roman Catholic Church declares itself the Apostolic Church, and the papal chair the apostolic chair, on the ground of an unbroken series of Roman bishops from the chief apostle, Peter. The Church of England, in virtue of regular episcopal ordination from the pre-reformation church, claims to be apostolic; so likewise do the Protestant Episcopal Churches in Scotland and the United States. Apostolic Tradition claims to have been handed down from the apostles themselves. In the same special sense, the name of Apostolic Council belongs to the conclave of the apostles at Jerusalem (Acts, xv.), about the year 50 A.D. Certain congregations or churches, also, which were the special scenes of the labours of the apostles, bore this title for centuries, more especially those of Jerusalem, Antioch, Alexandria, and Rome. But with the ever-increasing spiritual power of the Romish hierarchy, the name came to be more and more exclusively applied to Rome. Hence the term Apostolic See i.e. the see of Rome; Apostolic Blessing, the blessing of the pope as the successor of St Peter; Apostolic Vicar, the cardinal who represents the pope in extraordinary missions; Apostolic Chamber, a council intrusted with the care of the revenues of the see of Rome. Apostolic Majesty is a title

conferred by the pope on Stephen, the first king of Hungary, and still retained by the emperor of Austria as his successor. A papal brief or letter is styled apostolic in the same sense.—**APOSTOLICITY**, a term employed to denote that a church possesses the teaching of the apostles. The Roman Catholics use the term as expressing their claim that their church was founded by St Peter.

Apostolical Succession is a phrase used to denote one or both of *two* things— the derivation of holy orders by an unbroken chain of transmission from the apostles, and the succession of a ministry, so ordained to the powers and privileges of the apostles. The theory of the Catholic Church is that its present bishops have the right to ordain in virtue of being the representatives of the apostles, who in their turn represented the Lord himself, the fountain of all grace; and further, that the Lord committed his right or power to his apostles only, that it might be transmitted to all future ages of the church through them, next through bishops ordained by them, then by their successors in regular order. The scriptural argument is mainly based on such passages as Matt. xviii. 18. Opponents of this theory maintain that these words of institution had no such special significance; that, moreover, history shows that God did not take means to preserve such a succession in his church, for it was not till the 4th century that the church officers became a separate class, and in early stages of its history, laymen, as well as church officials, could teach or preach, baptise, celebrate the eucharist, exercise discipline, and perform all special functions now considered valid only if performed by a priest ordained by a bishop in regular succession. They maintain, moreover, that ordination meant merely appointment or admission to office, that no writer of the first two centuries either states or implies that those ordained had any exclusive powers, and that the facility with which ordinations were made and unmade strengthens this inference. The rite now considered essential the laying on of hands—in ancient times was not universal, and therefore could not have been a necessary element in ordination, being regarded merely as a symbol or accompaniment of prayer, without any special significance. See BISHOP, ORDERS, PRIEST; and on the destructive side of the argument, Hatch's able work, *The Organisation of the Early Christian Churches* (the Baunpton Lectures for 1880). See also the Dissertation on 'The Christian Ministry' in Lightfoot's edition of St Paul's *Epistle to the Philippians* (1868), where it is proved that though the episcopate was developed within the last thirty years of the first century, and cannot be dissociated without violence to historical testimony from the name of St John, yet the power of the bishops was at first merely a question of practical convenience, entirely unconnected with sacerdotalism, which was not implied in the term 'clerics,' either by Clement, Ignatius, Polycarp, Justin Martyr, Irenæus, or any father until Tertullian, and even by the latter was qualified by his assertion of an universal priesthood in believers. Lightfoot proves that sacerdotal views were due to Gentile influences, but found support in Old Testament analogies, and that Cyprian was the first to make those sacerdotal assumptions for the clergy which have since become so prevalent within the Catholic Church.

Apostolic Brethren, the name given in Italy, towards the end of the 13th century, to a sect which opposed the worldly tendencies of the church. Its founder was Segarelli, a weaver in Parma, who went about Italy preaching repentance and the need of a return to the mode of life of the apostles, including the primitive community

of goods. After twenty years of undisturbed activity and growing influence, the movement was condemned by popes Honorius IV. and Nicholas IV., and, in 1300, Segarelli perished at the stake, with many others, both men and women. Dolcino, a more energetic and cultivated man, now headed the orphan sect, and fortified a mountain near Vercelli; but after a gallant defence, compelled by famine to submit, he was tortured, and burned at the stake (1307). A Gnostic sect of the 3d century took the same name; as also a body of persons near Cologne in the 12th century.

Apostolic Constitutions and Canons, both ascribed by tradition to Clement Romanus, are notes of ecclesiastical customs held to be apostolical, written in the form of apostolic precepts. The *Constitutiones Apostolicæ*, consisting of eight books, were probably composed in Syria, and contain, in the first six books, a comprehensive rule for the whole Christian life. These were probably written about the end of the 3d century; while the seventh book, which, with the eighth, is thought to have been founded on the recently discovered *Teaching of the Twelve Apostles* (see above), may have belonged to the beginning of the 4th century. The eighth book was put together in the middle of the 4th century, for the use of priests, and relates only to the sacred offices. Interpolations, however, were afterwards introduced. The *Canones Apostolici*, which were also recognised by the church, were composed at a later period. The first fifty, compiled in the middle of the 5th century, and translated from Greek into Latin by Dionysius the Younger, were alone acknowledged by the Latin Church. The Greek Church, on the other hand, accepted the thirty-five canons put forth in the beginning of the 6th century; and this became a point of discord between the churches. Both collections were probably looked upon at first as apostolic traditions merely, but later came to be looked upon as due to the apostles themselves. See Bunsen's *Hippolytus*.

Apostolic Fathers, the name given to the immediate disciples and fellow-labourers of the apostles, and, in a more restricted sense, to those among them who have left writings behind them. Those specially so called are Barnabas, Clement of Rome, Ignatius, Hermas, and Polycarp. Papias of Hierapolis is also included by Irenæus, but this is probably an error. The writings of the apostolic fathers, as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them in spirit. Their main purpose is to exhort to faith and holiness before Christ's coming again. — Editions of the apostolic fathers were published by Cotelerius (Par. 1672), Jacobson (Oxford, 1838), Hefele (1839), and Dressel (1857); another by Gebhart, Zahn, and Harnack appeared in 1875-78 (3 vols.). There are several English translations, including one in Clark's *Ante-Nicene Library*. See Donaldson's *Apostolic Fathers* (1874). Standard editions of individual fathers are Bishop Lightfoot's exhaustive commentaries on the Clementine and Ignatian epistles. See FATHERS OF THE CHURCH, and the articles on each name.

Apostrophe (Gr. *apostrophê*, 'a turning away,' or 'breaking off') is a rhetorical figure by which a speaker changes the course of his speech, and addresses, with greater or less emotional emphasis, persons present or absent, the dead, or inanimate objects, either to invoke them as witnesses, or to pity, praise, or blame them. Quintilian explained it as directed to a person present, but modern use has extended it to the absent or dead, who are for the time being supposed to be present. When the figure is well managed, it has a thrilling effect,

both in oratory and poetry; but when extravagantly introduced, it becomes ludicrous. Examples of it abound in the writings and speeches of the great poets and statesmen both of ancient and modern times. --**APOTROPE** in Grammar, is the sign (') used to indicate the omission of a letter or letters in a word, as in *o'er, thro', can't*; and as a sign of the modern English genitive or possessive case, as in *boy's, boys', men's, conscience', Moses'*. In the latter case, it marked originally merely the dropping of the letter *e* in writing, as in *for's, James's*, and was equally common in the nominative plural. Gradually the latter use was dropped, and it was extended to all possessives, even where *e* had not been dropped, as in *man's, children's, conscience' sake*. This usage, as Dr Murray points out, was not yet established in 1725.

Apothecary, the name formerly given in England and Ireland to members of an inferior branch of the medical profession. The apothecary was in England a licentiate of the Apothecaries' Society of London; in Ireland, a licentiate of the Apothecaries' Hall of Ireland. Up to a comparatively recent period, however, no inconsiderable proportion of those who practised as apothecaries, at any rate in England, were persons practising without any license. The licensed apothecary frequently kept a shop in which he sold drugs and made up medical prescriptions, in this respect competing with the chemist and druggist. But he was entitled to attend sick persons, and prescribe for them; and though it was the almost universal practice of apothecaries to charge their patients only for medicines supplied, they had the alternative of charging for their attendances, but could not charge for both. The term apothecary has been long in disuse, though, no doubt, it is still a legal description for licentiates of the Apothecaries' Society of London, or of the Apothecaries' Hall of Ireland; and such licentiates are now, as licentiates in medicine before the law, on a par with the graduates of universities.

Anciently, the apothecaries were not distinguishable from the grocers (the surgeons being, in like manner, undistinguishable from the barbers); and it was not till 1617, in the 13th year of James I., that these bodies were formed into two distinct corporations. A statute of 1815 enacted that no person should practise as an apothecary, or act as an assistant to an apothecary, in any part of England or Wales, unless he had been examined by a court of examiners, and had received therefrom a certificate; and any person practising without such certificate was disabled from recovering his charges, and for every such offence was, moreover, rendered liable to a penalty of £20. An act of 1874 amended the act of 1815, and gave the Apothecaries' Society power to co-operate with other medical licensing bodies in granting licenses.

In Scotland, there never was a class of practitioners corresponding to the English apothecaries. See **CHEMISTS AND DRUGGISTS**.

Apothe'cia. See **LICHENS**.

Apotheosis (pronounced formerly *Apoth'eosis*, now *Apoth'eosis*; from Gr. *th'os*, 'a god', deification, or the raising of a mortal to the rank of a god. It is a process quite consistent with primitive philosophy, as it is only a particular case of spirit-worship and of ancestor-worship, a special application of the animistic principle. The belief in the immortality of the dead is at once its cause and the condition of its being granted. As the logical corollary to the worship of ancestors, it has been an important factor in religions, though the simplicity of its origin has often been obscured by the accretions of the mythical. The honours paid

to the Chinese philosopher Confucius -- the principal part for more than two thousand years of the religion of the educated in the Celestial Empire -- present the only example of a pure apotheosis, without any admixture of mythological elements. The process is still seen going on among many Indian tribes, as in the case in South India of that departed English officer who continues, as in life, to be appeased with offerings of cheroots and brandy. Apotheosis has had greater influence on political order than on religious conceptions. It has been the instrument of theocracy and of monarchy, the foundation of the divine right of kings. Born of the worship of the dead, it rapidly degenerated into the adoration of the living. Once the survival of the soul was admitted, nothing appeared more natural than to anticipate its future divinity.

Over all the world, sorcerers, chiefs, kings, and conquerors have turned to account this logical consequence of animism. The Peruvian of Pizarro's time, the Chinese, the Japanese, have their sacred kings, sons of the sun or moon. In Egypt, the Pharaohs and the Ptolemies took their place at the same moment on the throne and on the altar. Lysander, the conqueror of Athens, was worshipped in Asia Minor; Alexander declared himself the son of Ammon, and insisted at last on the same honours as were due to his divine parent. At Rome, the apotheosis of the *Jencus* of fable, and of the legendary Romulus, was but the prelude to that of *Cæsar*. Augustus in his turn became a god; while declining the adulations of the senate, he let himself be deified everywhere except at Rome. In every kingdom temples sprang from the ground, and colleges of priests were instituted for the service of the new deity, whose praises were chanted in music by Virgil, Horace, and Ovid. Nor was sincerity wanting to that enthusiasm. At the end of frightful civil wars, the world hailed the era of peace. Augustus was quick to see the political advantage of this universal idolatry. It linked the whole empire together, the sacred person of the emperor becoming the guarantee for all its institutions. The cult was assiduously spread, and when once it was linked to the fundamental worship of mankind, that of ancestors, manes, lares the most tenacious form of animism, particularly dear to the Romans -- it proved too strong even to be weakened by the vices and folly of a Caligula or a Nero, or the outrage of an imperial decree requiring divine worship also for a Poppæa or an Antinous. An analogy has been pointed out between apotheosis and the canonisation decreed by Christian pontiffs; and traces of the Roman usage survive in the inveterate notion in the monarchies that grew out of the ruins of the old Roman empire, of the 'divinity that loth hedge a king.' It was not alone in the 'Holy Roman Empire,' which claimed for itself the proud descent of the old Roman power, that this special sanctity was supposed to exist; but by a kind of partial apotheosis it was connected with every head that wore a crown, -- none with more perverse and fatal tenacity than some of the least godlike of our English kings.

Appalachians, a great mountain-system of North America, nearly parallel with the Atlantic coast, and extending from the Gulf of St. Lawrence SSW. to the west. Copyright 1888 in U.S. by J. B. Lippincott Company. central portion of Alabama. Geologically, it is much older than the Western Cordillera, known as the Rocky Mountain system, but it is in the main much later in geologic date than the Laurentide system, which represents it on the north of the St. Lawrence. It is the parent of many of the rivers of the Atlantic States; but

several large streams break its continuity; and one, the river Hudson, is a tidal channel which carries even sea-going vessels through the range, a phenomenon very unusual in any part of the world. The Appalachians consist, in the main, of various parallel ranges, separated by wide valleys. Even the low hill-ranges between the mountains and the sea have much of the same parallelism, and the sea-coast has in a marked degree the same general direction and curvature as the mountains themselves; while, far to the NE., the nearly detached peninsula of Nova Scotia and the island of Newfoundland are traversed by ranges exhibiting the same parallelism and the same general direction as are seen in the Appalachian ranges. In no mountain-system do we find better illustrations of the celebrated theory of the late H. D. Rogers concerning the process of mountain formation than in this. The wave-like structure is regarded as due to pulsations in the fluid matter beneath the earth's crust, propagated in great waves of translation from vast ruptures due to the tension of elastic matter. The shape of the ridges, the plications of the strata, and the final direction of the flexures, are regarded as results of a combined undulating and tangential movement. During this movement rents occurred along some of the bendings, out of which dykes and veins of igneous matter were poured. In short, a great earthquake, or succession of earthquakes, here occurred, during which the earth's crust received much of that corrugation of surface which these mountains at present exhibit. At the same time the oscillations of the crust seem to have actually thrown forward or floated the earth's crust along the surface of the fiery sea on which it rested.

Locally, the Appalachians have various names. In the Gaspé Peninsula we find the Shickshock Mountains, and then the White Hills, and the Franconia Mountains of New Hampshire, where Mount Washington attains the height of 6293 feet. In the Green Mountains of Vermont, the disposition of the mountains into parallel chains becomes apparent. In Massachusetts, the main ridge is locally called the Hoosic Range, and the more westward ridge is the Taghkanic. To the east of the Hudson lie the Highlands; on the west side of the river are the Catskills, Shawangunk Mountains, and other groups, with only local exemplifications of parallelism. In Pennsylvania, the mountain-ridges are long, and are marked by a singular evenness of their tops, there being few noteworthy peaks, but many gaps for the transmission of streams. Still farther to the SW. the flat mountain-tops often become wide treeless plains, densely covered with grass, and having a soil sometimes rich, but often heavy and wet. In some instances, however, these narrow plateaus are singularly dry and barren. The valleys between the ridges have sometimes an extremely fertile soil, resting upon cavernous limestone, with beds of valuable iron ore; but some of the valleys have a lean slaty soil. In Pennsylvania and Maryland, the most seaward of the important ridges is the South Mountain or Blue Ridge, which is regarded as identical with the Unaka or Smoky Mountain Ridge of North Carolina and Tennessee; what is called the Blue Ridge of North Carolina being a nearly parallel eastern chain, which in the SW. part of Virginia coalesces with the Blue Ridge proper. West of the South Mountain of Pennsylvania comes the great Alleghany Ridge, which often gives name to the whole system. It is much more remarkable for its uniformity and flatness of top, and for the absence of breaks, than the South Mountain or Blue Ridge. In the great valley between the two main crests are several minor parallel ridges, and

the same feature is apparent in the elevated region which is bounded eastward by the main Alleghany. The great Cumberland Mountain plateau of Kentucky and Tennessee may be taken as the SW. representative of the Alleghanies proper. Crossing Tennessee, the western parts of the Carolinas, and the NW. of Georgia, the system terminates in the broken hilly plateau of Central Alabama.

Nowhere do the Appalachians reach the snow-line. Their highest points occur in North Carolina, where Mitchell's Peak reaches the height of 6688 feet. The Appalachians must have been, in the main, developed after the Carboniferous, and before the Jurassic period, although the material of the NE. part of the range is largely referable to a very much more remote age—viz. the Huronian, or perhaps even the Laurentian age. Whatever strata more recent than these may have once helped to form the mountains of New England, they have been to a great extent removed by glacial or other erosive processes.

The principal coal-beds of this chain occur in Pennsylvania to the NNE., and in the other states southward along the mountains to their termination in Alabama, the chief coal-basins being either among the mountains, or to the westward of them. There are beds of anthracite coal on the eastern slopes of the Appalachians, chiefly in Pennsylvania, west of which the coal becomes bituminous, after we have crossed basins of semi-anthracitic and moderately bituminous coal. This coal region is one of the most productive, extensive, and important anywhere known. Of the metals, by far the most important is iron, of which various ores of magnetic, hematitic, and fossiliferous character occur very extensively, and are largely wrought. Gold occurs chiefly to the eastward of the mountains, and is wrought at various points from Virginia to Alabama. Zinc, lead, and other metals are found in this range, which also affords marbles and other limestones, slates, and a great variety of building-stones.

Appalachicola, a river of the United States, rising in Georgia, and flowing through Florida into a bay of the same name, in the Gulf of Mexico. Reckoning from its remotest sources, the headwaters of the Chattahoochee, the Appalachicola is about 400 miles long, being navigable for boats throughout nearly its entire course, and for steamboats up to the junction of the Chattahoochee with the Flint, when the name of Appalachicola is applied to the stream, a stretch of about 70 miles. APPALACHICOLA is also a seaport at the mouth of the stream above mentioned. Here is shipped the produce of the river-basin, consisting chiefly of large quantities of cotton.

Appanage is not an English legal term, but is a technical word in the French law, in which system it signifies the assignment or conveyance by the crown of lands and feudal rights to the princes of the royal family, that they may be enabled to maintain themselves according to their rank. This was done in France from the time of the early Capets to the Revolution, and the importance it gave to the princes accounts for much in the history of France. The word is also applied to the patrimony of the Prince and Steward of Scotland, which 'has been long erected into a regality jurisdiction, called the principality. The prince has, or may have, his own chancery, from which his writs issue, and may have his own chamberlain and other officers, for receiving and managing his revenue.' In England, the duchy of Cornwall (q.v.), originally granted by parliamentary charter to the Black Prince, may be said to be an appanage of the Prince of Wales, in whose person also, since the junction of the two kingdoms

under the same crown, now merge the rights of the Prince of Scotland. In all these cases, the appanage would probably revert to the crown on failure of lineal heirs-male. In Great Britain, further provision for the maintenance of the royal princes is made by the grant of annuities by parliament.

Apparent. This term is used to express a number of important distinctions, especially in astronomy. The *apparent magnitude* of a heavenly body is the angle formed by two lines drawn from the ends of its diameter to the spectator's eye; this obviously depends upon the distance of the body, as well as upon its real magnitude. A planet seen from the surface of the earth seems lower than if seen from the centre of the earth—the former is its *apparent altitude*, the latter its real. *Apparent noon* is when the sun is on the meridian; true or mean noon is the time when the sun would be on the meridian if his motion in the heavens were uniform and parallel to the equator (see EQUATION OF TIME). The daily and annual motions of the sun in the heavens are both *apparent motions*, caused by two real motions of the earth.

Apparitions. The belief that the spirits of the departed are occasionally presented to the sight of the living, has existed in all ages and countries, and usually declines only when a people has advanced considerably in the knowledge of physical conditions and laws. We can understand the inability of the primitive man and the savage to realise death. The memory of the deceased lends power to call up his appearance. The primitive man does not observe accurately the distinction between fact and fancy—between what is seen in dream and what is seen in reality. Tylor, in his *Researches into the Early History of Mankind*, says: 'The belief that man has a soul capable of existing apart from the body it belongs to, and continuing to live, for a time at least, after that body is dead and buried, fits perfectly in such a mind with the fact that the shadowy forms of men and women do appear to others, when the men and women themselves are at a distance, and after they are dead. We call these apparitions dreams or phantasms, according as the person to whom they appear is asleep or awake; and when we hear of their occurrence in ordinary life, set them down as subjective processes of the mind. Among the less civilised races, the separation of subjective and objective impressions, which in this, as in several other matters, makes the most important difference between the educated man and the savage, is much less fully carried out.' The Dyaks regard dreams as actual occurrences; and many savage races believe that dreams are incidents which happen to the spirit when it is wandering from the body. In sleep, the soul is supposed to leave the body and travel about. If so, why may it not be encountered by some one? The man who fancies he sees at night the figure of a friend, or of an enemy, supposes he sees this dreamer's wandering soul. Among primitive races there is a superstitious objection to rousing a sleeper, lest he should awake before his soul has had time to return to the body. One is regarded as another form of sleep; and during that sleep the spirit is wandering, and when wandering, may be met. The relative think of his deceased kinsman, dreams of him, and supposes he has seen his spirit. Madge Wilfire, in her rambling talk of her dead baby, expresses this confusion of mind between objective and subjective vision: 'Whiles I think my poor bairn's dead—ye ken very weel it's buried—but that signifies naething. I have had it on my knees a hundred times, and a hundred till that, since it was buried

—and how could that be were it dead, ye ken—it's merely impossible.'

One of the modern theories of the natural origin of religion is, that it comes altogether from belief in the reappearance of the dead, and is, in fact, the cult of the ghosts of ancestors. Witchcraft, necromancy, has always been intimately connected with the spirits of the dead, and this is regarded as the parent of all religious worship. The savage man fears the dead and seeks to propitiate them, and gradually forgets that the ghosts are those of ancestors, and considers them as demons, a separate order of spirits; and later, as he advances in intelligence, these demons cease to be altogether demoniacal, and become gods. Be that as it may, it is certain that the propitiation and even worship of the dead has formed an integral part of all primitive religions, and has maintained its hold among the more ignorant after it has ceased to affect the more educated.

A diseased condition of the body, pressure on the brain, produces optical delusion. The writer of this article remembers distinctly how, as a child, he was seated on the box of a coach on a burning summer day, on his way over the great stony plain about Marseilles, when he saw hideous objects, as imps and demons, running by the horses, and vaulting on their backs. He spoke to his father about them, and was at once removed within the carriage, where, away from the sun on his head, the sight of the imps gradually failed. On another occasion, when suffering from inflammation of the lungs, lying with his eyes open, he believed he could see through the back of his head and bed, and watch a group of persons engaged brewing the elixir of life at a fire. The apparitions seen in *delirium tremens* belong to the same category.

The brain consists of two hemispheres, and this enables a double current of ideas to flow through the mind simultaneously; for instance, it is quite possible to read a book aloud, and all the while to be thinking about something else. Attention consists in the uniting and concentrating the thought of both hemispheres, and as one eye controls the observations of the other, and completes it, so is it in the two hemispheres of the brain; the one checks and complements the other. Now, in certain conditions easily induced, when the mind is not on the alert and braced to attention, it is possible for one hemisphere of the brain to receive an impression and form a subjective picture of a person or object independently of the other, and unless the attention be at once aroused, and this picture be critically investigated, this waking dream of one part of the brain may be taken to have been an actual sight of what was really presented to it.

It is, moreover, curious to observe how easy it is for a perfectly sincere and upright person to deceive himself as to what he has seen, simply from the fact that he has not been attentive, and has not observed critically what has presented itself before him, and he readily falls into the error of accepting a subjective perception for an objective vision. He may have a little doubt at first, but after he has once taken in what he has seen, all doubt fades away. His spoken account of what he saw gives consistency to the shadowy sight, and without an intention to deceive, he deceives himself as well as others.

The fear of seeing something often so dazzles and bewilders the visual organ, that it sees the things that were feared. This accounts for many stories of the sight of apparitions in haunted houses. A crime is supposed to have been committed in some old house, and superstition believes that the spirit of the murderer or of the murdered person cannot rest. Whoever is nervous and timid, and visits this

house at night, is predisposed to see the wandering spirit, and the fear that is present deprives the judgment of its power of taking accurate observations of what really is seen, and so superinduces a lax condition which is ready to be deceived. There may be conditions of body which allow of a sight beyond what is given to most, as it is certain that beasts see and scent and hear what our own faculties fail to perceive. But what we insist on is, that the greatest caution should be exercised in receiving stories of apparitions, and the utmost care taken to investigate every case of apparent spiritual manifestation. Before we can admit that there are genuine cases of ghosts having been seen, we must be satisfied that the observer was in full possession of his faculties, that his attention was on the alert, that he was capable of judging between subjective and objective presentations, and that he was in a healthy condition of mind and body.

In 1882 a Society for Psychical Research was founded for the scientific and systematic investigation of reported apparitions, clairvoyance, haunted houses, hypnotism, thought-reading, and the phenomena called spiritualistic; and it publishes its Proceedings. Compare with the present article those in this work on ANIMAL MAGNETISM and SOMNAMBULISM; also HALLUCINATIONS.

Among the most famous stories of apparitions, we may mention that told by Cicero of the murdered man appearing to his friend and warning him where to find him in a hay-cart; the apparition of Julius Caesar before the battle of Philippi; that which appeared to Lord Erskine; the famous story of the Earl of Tyrone and the black ribbon, which, however, has been shown by a writer in *Notes and Queries* to be full of discrepancies; the appearance of Sir George Villiers before the murder of his son, the Duke of Buckingham; the case of Sir Charles Lee's daughter (1662); the trains of phantasms that appeared to the publisher Nicolai in Berlin (1791); and the Wynyard ghost story. According to widespread superstition, the apparitions of those about to die in the ensuing year are seen to enter the parish church on St Mark's eve. The most famous account of such a weird procession is that given by Gervase Hollis, reprinted in Chambers's *Book of Days*, i. 549.

Apparitions may be variously classed. There are the *recurrents* proper, the ghosts of the dead which reappear, return to walk the earth; the *fitches*, *doublets*, or the second-self, in which case it is the 'counterfeit presentment' of one still living; the *Poltergeist*, a noisy impish spirit, who amuses himself with upsetting everything in a house, throwing stones, and making unearthly noises. There are also *spectral animals* said to haunt buildings, churchyards, &c. It has been recently shown by the Rev. S. Baring-Gould (*Murray's Magazine*, vol. i. p. 363) that these are reminiscences of animals formerly immured alive under foundations. Appearances of strange lights, and the hearing of mysterious sounds, all belong to the same group of spiritual manifestations. The *Banshee* (q.v.) has its analogues elsewhere than in Ireland, and is held to be an attendant spirit on a family, that appears before the death of a member of it.

The literature on apparitions is voluminous; we can only notice a few of the most important writers on them. Sir David Brewster, in his *Natural Magic* (1832), contended for the rational and natural explanation of the spectral illusions. Before that, an admirable book by Hemmings, *Von Ge tern u. Geisterschern* (1780), laid the basis of true criticism on spectral appearances. Dr J. Kerner, in his *Magikon* (5 vols. 1840-53), collected the best authenticated stories of ghosts, which he explained

by animal magnetism. Mrs Crowe, *The Night-side of Nature* (1853), followed in the same line. Collections of what purport to be well-authenticated stories of apparitions are Dr Lee's books: *The Other World, or Glimpses of the Supernatural* (1875), *More Glimpses of the World Unseen* (1878), and *Glimpses in the Twilight* (1885); also *The Unseen World* (1876); *Ghostly Visitants* (1882); A. Stolz, *Die Schreibende Hand* (1880); and Ingram's *Haunted Houses* (1884). See Carns Sterne's *Naturgeschichte der Gespenster* (Weim. 1863); Dr Tylor's *Primitive Culture* (1871); and Gurney and Myers, *Phantasms of the Living* (1886).

Apparitor, the general name for the public servants of the magistrates in ancient Rome, so called because they were at hand to carry out the magistrates' orders. The name is still applied to the lowest officer of an ecclesiastical court, also in a somewhat general sense to an officer of a civil court, and specially to the beadle of a university who carries the mace.

Appeal is the right or process of bringing under the notice of a higher court the judgment of a lower court which the appellant represents as erroneous in fact or law. Formerly, this right was a valuable guarantee against political oppression and private extortion e.g. the appeal to royal judges from the courts of feudal barons. Now, the object of appeal is to secure uniformity in the administration of justice. This is effected not merely by the reversal of erroneous judgments which are appealed, but by the knowledge which every judge has of precedents in the Supreme Court, and that his own judgments are subject to appeal. The most important questions connected with the modern system of appeal are: (1) Whether in all cases, of whatever pecuniary value, appeal is allowed, and also whether at all stages, or only after final judgment; (2) On what conditions, as regards time, *interim* execution, and security for costs, appeal is allowed; (3) The relative constitution of the lower and higher courts.

In the civil law, the earliest form of appeal was the *provocatio* from the judgment of a criminal court to the Roman people. This fell into disuse under the *Quæstiones Perpetuæ*. The *appellatio* was a veto or interdict granted upon the *intercessio* of one complaining of a judicial act. The subordination of judges increased largely under the empire, and for some time the emperor, who was tribune for life and also proconsul, was the only final court of appeal. Latterly, the senate and the prætorian prefects also gave final decisions. Only six months were given for appeal from the most distant provinces. The law is stated in detail in the Digest, lib. xlix.

In the Christian Church, under the judicial system defined in the False Decretals, frivolous appeals direct to the Roman Consistory multiplied enormously. The remonstrances of St Bernard were gradually given effect to by the Lateran and Basel Councils, and wholesome restrictions on the right of appeal, and in favour of the independence of Cisalpine church courts, passed into most modern concordats. Even the indirect recognition of the judicial supremacy of the pope was in England made a statutory offence under the name of *Premunire*. The famous *appel comme d'abus* in France was originally an appeal to civil justice against the encroachments of church jurisdiction. Enough has been said to show how closely the question of appeal is connected with the great problems of political history: national independence, the relations of central and provincial authorities, &c.

In English law, prior to the Judicature Acts, 1873 and 1875, the word appeal was not commonly

used. In common law courts, there was a proceeding in 'error' by 'assignment of error' and 'joinder of error.' The old 'writ of error' and 'writ of false judgment' are still sometimes used in bringing up the proceedings of certain inferior courts. In Chancery, the appeal was formerly called 're-hearing,' the Vice-chancellor being regarded as the delegate of the Lord Chancellor. Under the modern system of 'fusion,' every judgment in the High Court of Justice (except a judgment of the Court of Probate where leave is required) may by simple motion be submitted to the Court of Appeal, to have it reversed, discharged, or varied. Interlocutory proceedings in chambers may also be appealed to a judge in chambers; and from him appeal lies to the Divisional Court. In the Chancery Division, the judge has the discretion of directing the matter to be argued before him in court, or allowing appeal direct to the Court of Appeal. An appeal in Divorce requires in many cases to be to the 'full court,' not to the ordinary Court of Appeal. This last court consists practically of six Lords Justices of Appeal, sitting in two divisions—one for Common Law Appeal; the other for Chancery, Probate, Admiralty, and Bankruptcy Appeal. The courts it superseded were: (1) In Chancery, the Lord Chancellor and Lords Justices; (2) At Common Law, the Court of Exchequer Chamber, consisting of the two Common Law Courts whose judgment was not under appeal. In 1873 it was proposed to abolish the appeal to the House of Lords, but still in all cases a petition of appeal may be brought to it from the judgments of the Court of Appeal. An appeal lies to the Judicial Committee of the Privy-council from an Indian or colonial court, but such appeal most frequently requires leave from the court below or the Judicial Committee, and, generally, security has to be given for costs.

As regards appeal from the inferior courts in England, an appeal lies from the county court to a divisional court of the High Court of Justice. All determinations in law by justices of the peace (including metropolitan police and stipendiary magistrates) may be brought up on a case stated under 20 and 21 Viet. chap. 43, for the opinion of a divisional court of the High Court of Justice. As to appeals in ecclesiastical causes, the Privy-council is the Supreme Court of Appeal in all ecclesiastical causes which may originate in the diocesan and provincial courts; but the High Court of Justice, especially in the Chancery Division, may frequently, in questions of trust and property and contract, have to decide purely spiritual questions.

Questions of law arising on the trial of a person convicted of treason, felony, or misdemeanour (e.g. at the Central Criminal Court, the assizes or quarter sessions), may be reserved by the judge or justice trying the case for the consideration of the Court for Crown Cases Reserved, established by the Act 11 and 12 Viet. chap. 78. This court must consist of at least five judges of the High Court of Justice.

The law of appeal in Ireland is practically the same as in England.

In Scotland, in the Court of Session the judgments of the Lords Ordinary sitting in the Outer House are appealed by a reclaiming note to the First or Second Division of the Inner House. The opinion of four judges is thus obtained on the opinion of one judge. These appeals are discontinued, except after final judgment by the Lord Ordinary, but they are competent at other stages though in most cases only with leave of the judge. From all final judgments of the Inner House there is an appeal to the House of Lords within a period of one year. Where the judgment is not final,

leave to appeal must be got, unless there has been a difference of opinion among the judges. Pending an appeal, the Court of Session have absolute power to regulate *interim* possession of property or execution of a decree for money.

The Court of Session has exclusive jurisdiction as a Court of Review in *civil* causes over all inferior courts, even in cases where its original jurisdiction is excluded, unless there be an express exclusion of review by statute; and where appeal is excluded, the Court of Session has jurisdiction to set aside their decisions, where they have acted in excess of their statutory jurisdiction. In the latter case, the technical remedy is generally by a note of suspension or an action of reduction. The normal appeal, however, from final judgment in the Sheriff Court is by Note of Appeal under the Court of Session Act, 1868, and this goes directly to the Inner House. Cases are often brought up before judgment in the Sheriff Court for jury trial in the Supreme Court. The Court of Session, sitting as the Registration Appeal Court and the Valuation Appeal Court, hears appeals from the Registration Courts held by the sheriffs, from the valuation committees of the commissioners of supply, and from the magistrates in burghs; and there is also an appeal as to excise duties from the justices at quarter sessions.

Within the Sheriff Court itself, the right of appeal from the sheriff-substitute to the sheriff-principal is regulated by the Sheriff Court Acts, 1853 and 1876. Appeals from the Small Debt Court are confined to certain grounds mentioned in the Act 1 Viet. chap. 41 (such as malice and oppression and defect of jurisdiction in the judge), and are made to the next Circuit Court of Justiciary.

At common law, the High Court of Justiciary may review the proceedings of all inferior courts in criminal matters, but not on the merits. This is mainly done by the remedies of advocacy and suspension. As regards summary prosecutions before magistrates, the right of appeal consists of a case stated for the opinion of the High Court of Justiciary or the Court of Session, according to the criminal or civil nature of the prosecution. This is regulated by the Summary Prosecutions Appeals Act, 1875. Where a question of law arises on a criminal trial by jury, whether before the sheriff or at circuit, there is no right of appeal to the High Court of Justiciary. The judge presiding at circuit occasionally 'certifies' a question of law as requiring discussion at the High Court, but he is not bound to do so. There is no appeal from the High Court to the House of Lords, although this right was frequently claimed last century.

In ecclesiastical courts in Scotland, there is in most cases a regular appeal from Presbytery to Synod, and from Synod to General Assembly. In questions of contract, property or trust, however, it has been found impossible to exclude the jurisdiction of the civil courts.

In the United States, the distinction between an appeal, which originated in the civil law, and a writ of error, which is of common law origin, is that the former carries the whole case for review by the higher court, including both the facts and the law; while the latter removes only questions of law. An Act of Congress of 1875 provides that the judgments and decrees of the circuit courts of the United States shall not be re-examined in the Supreme Court unless the matter in dispute shall exceed the sum or value of \$5000, exclusive of costs. No judgment, decree, or order of a circuit or district court, in any civil action at law or in equity, shall be reviewed in the Supreme Court on writ of error or appeal, unless the writ of error is brought, or the appeal is taken, within two years after the

entry of such judgment, decree, or order; save in the case of infants, insane persons, and imprisoned persons, when the period is two years, exclusive of this term of disability. An appeal from a district court to the circuit court of the United States must be taken within one year. An appeal from the district court in admiralty to the circuit court must be made immediately after the decree, in open court, before the adjournment *sine die*; and it should be taken to the next succeeding circuit court. An appeal may be taken from the state courts to the Supreme Court of the United States, in cases involving the validity of a treaty or statute of, or authorised under, the United States; on the ground of repugnance to the constitution; and in certain other specified cases.

Appendicularia, a genus of Ascidians (q.v.), and type of a small but important order, the members of which retain the larval vertebrate characters which are lost in the more or less degenerate adult sea-squirts. Appendicularia is a minute free-swimming form with a long tail, and closely resembles an Ascidian larva. The brain and dorsal nerve-cord, the long notochord, the two respiratory slits opening directly from the pharynx to the exterior, and other vertebrate structures lost in the adult Ascidians, are here retained throughout life, and demonstrate the true position of the class to which Appendicularia belongs.

Appenzell (from *Abbat's Villa*), a double canton in the N.E. of Switzerland. It is divided into two divisions—Inneroden and Ausseroden; the former of which is peopled by Roman Catholics; the latter by Protestants, and noted for its dense population. The surface is mountainous, especially in the south, where Mont Sents attains an elevation of 8220 feet. The chief river is the Sittern, which flows through the centre of the canton. The constitution of the half cantons, each differing from that of the other in many details, is in each case a pure democracy. The inhabitants are chiefly employed in agriculture and cattle-keeping; in Ausseroden, however, there are cotton manufactures and embroidery carried on. The dialect is peculiar, and the Appenzellers wear a characteristic costume. The canton, once dependent on the Abbey of St. Gall, won its independence after a struggle, and joined the seven old cantons in 1452. Area, 162 sq. m.; pop. (1880) 64,799, of whom 60,000 are in Ausseroden.

Appenzell, capital of the canton, is situated on the left bank of the Sittern; pop. (1880) 4302 (157 Protestants). The town is ill built, and has only a small trade in linens. The largest town is Herisau (pop. 11,082).

Apperley, CHARLES JAMES, an English sporting writer, born in Denbighshire in 1777. Educated at Rugby, he married early, and settled in Warwickshire, where he devoted himself to hunting. In 1821, under the name of 'Nimrod,' he began to contribute such attractive articles to the *Sporting Magazine* that its circulation was soon doubled. The proprietor paid him handsomely, and advanced him money, but his heirs afterwards brought an action against Apperley for its recovery. Nimrod prudently transferred himself to France, where he chiefly resided during the rest of his life. He died 19th May 1843. His best writings are *The Chase, the Turf, and the Road*, which appeared in the *Quarterly Review* (1827), and the *Life of a Sportsman*, to the 1873 edition of which is prefixed a memoir of himself.

Appert, BENJAMIN NICOLAS MARIE, a French philanthropist, born in Paris, September 10, 1797, began about 1816 to introduce into several schools in the Nord department a system of mutual instruction, and in 1820 to teach the prisoners at

Montaigu. Suspected of having aided the escape of two prisoners, he was himself in gaol for three months. In 1825 he travelled through the whole of France, in order to discover means of elevating the criminal classes, and recorded the results of his investigations in a Journal started for this purpose. From 1841 to 1844 he managed a colony for liberated prisoners and the children of prisoners at Némelfing, in the Moselle department; and after 1846 he travelled in Belgium, Germany, and Austria, giving the results of his observations on the management of schools and prisons in several works, marked by great fairness and candour. He also wrote a work entitled *Die Ans à la Cour du Roi Louis-Philippe*, and, in his *Conférences contre le Système Cellulaire*, strongly opposed the system of solitary confinement.

Appetite (Lat. *appetitus*, from *appeto*, 'I desire') is generally used of the natural desire for food experienced in health. Its causes are two: (1) A condition of the *stomach*, not yet accurately understood, relieved by taking food; (2) A condition of the *system*, not relieved till the products of digestion begin to be absorbed into the blood. These are usually present together, but either may act without the other. The stomach-condition is that in which the organ is in the most favourable state for digestion, and tends to recur at the habitual meal-hours; but often passes off if eating be long deferred, though the need and craving of the system for food remains. Hence the importance of taking food at regular hours. Too free indulgence of a naturally large appetite frequently leads to indigestion and ill-health, especial in persons of sedentary habits. This danger is much less if the food be eaten slowly and thoroughly masticated; for in that case the digestion of the food first taken has advanced so far before the close of the meal, as to appease the system-appetite. Habitual stimulation of the appetite, especially by the pernicious practice of taking alcohol before meals, leads to equally injurious results.

Alteration of the appetite is perhaps the most common of all the symptoms of disease. Occasionally it is increased. *Morbid Appetites* may consist of a desire which is, in character, natural and necessary to the animal economy, but becomes unhealthy when excessive and irresistible. Of this, the hunger which attends marasmus, and the thirst which attends diabetes, may be cited as illustrations. They may consist, further, in a craving for articles or objects not in reality deleterious or detrimental, but which do not constitute the ordinary gratification of the appetite, such as the desire for chalk and lime experienced by chlorotic and hysterical women. They may, thirdly, consist in the longings, often complicated with delusions, felt by pregnant women and others, which are injurious, repugnant to nature, and revolting. Georget gives an instance where a wife coveted the shoulder of her husband, killed him in order to obtain the morsel, and salted the body in order to prolong the hideous cannibalism. In such a case, the gross longing may be said to constitute the disease; but there are others in which it is one of many symptoms demonstrating the degradation of the mind under general disease, as when the insane devour garbage and excrement, or swallow grass, hair, stones.

Much more frequently the appetite is diminished, and accordingly medicines which increase the appetite and improve the digestion are often necessary. The chief of these *stomachic tonics* are—vegetable bitters, as quinine, hop, gentian; dilute mineral acids; salts of iron; pepsin and other digestive agents prepared from the organs of the lower animals. See DIET, DIGESTION, DYSPERSIA, FOOD; cf. also THIRST.

Appian (Lat. *Appianus*), a native of Alexandria, who flourished during the reigns of Trajan, Hadrian, and Antoninus Pius. He was author of a Roman history in twenty-four books, of which only eleven are extant. It was remarkable principally for the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the empire, its author divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes, and afterwards followed the history of Sicily, Spain, Hannibal's wars, Libya, Carthage and Numidia, Macedonia, Greece proper and its colonies, Syria, Parthia, the Mithridatic war, the civil wars, and the imperial wars in Illyria and Arabia. As a historian, Appian is a mere compiler, and not very accurate in his compilation. His geographical knowledge, in particular, is singularly deficient, considering the age in which he lived. One specimen of his blunders will suffice; in his section on Spain, he states that it takes only half a day to sail from Spain to Britain. The edition by Schweighauser (1785) is esteemed, but the best text is that in Bekker's edition (2 vols. Leip. 1852-53).

Appiani, ANDREA, styled in his day 'the Painter of the Graces,' was born at Milan, May 23, 1754. His style was formed from a close study of the works of Raphael and other masters of fresco-painting, and his first works were a series of frescoes in Milan. His best works are the frescoes of the myth of Eros and Psyche in the royal villa at Monza, the enlaid-paintings in the church of *Santa Maria di S. Celso* at Milan, and Apollo with the Muses in the Villa Bonaparte. Napoleon I. patronised him, but after his fall Appiani fell into great poverty. He died at Milan, November 8, 1817.

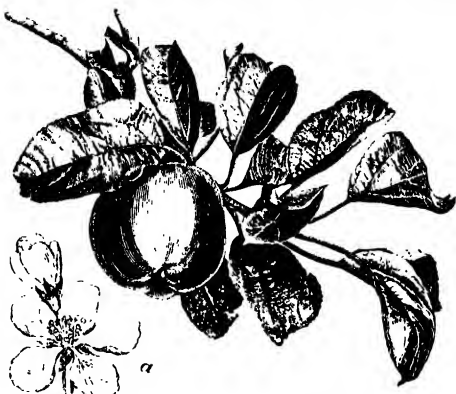
Appian Way (Lat. *Via Appia*), well named by an ancient writer *Regina Viarum* ('the queen of roads'), was formed, in part at least, by Appianus Claudius Cereus, while he was censor (313 B.C.). It is the oldest and most celebrated of all the Roman roads, and with its branches connected Rome with all parts of Southern Italy. It had an admirable substructure or foundation, from which all the loose soil had been carefully removed. Above this were various strata cemented with lime; and lastly came the pavement, consisting of large hard hexagonal blocks of stone, composed principally of basaltic lava, and jointed together with great nicety, so as to appear one smooth mass. The cost must have been enormous, for the natural obstructions are great. Excavations instituted by the papal government in 1850-53 reopened the road as far as Albano. The railway from Rome to Naples crosses this restored portion (now called the *Via Appia Nuova*) near the eleventh milestone from the capital.

Appin (*Apthane*, 'abbey lands'), a beautiful coast district of Argyllshire, extending along the east shore of Loch Linnhe, 15 miles NNE. of Oban. It is the country of a branch of the Stewarts, whom Hogg has celebrated in verse, and a history of whom was published at Edinburgh in 1880.

Appianus Claudius. See CLAUDIUS (APPUS).

Apple (*Pyrus malus*. For the generic character, see *PYRUS*). This well known fruit has been very long cultivated, and by that means it has been very much improved. It was extensively cultivated by the Romans, by whom, probably, it was introduced into Britain. The wild apple, or Crab-tree, a native of Britain, and very generally found in temperate climates of the northern hemisphere, is a rather small and often somewhat stunted-looking tree, with austere, uneatable fruit; yet it is

the parent of all, or almost all the varieties of apple so much prized for the dessert. The apple-tree, even in a cultivated state, is seldom more than 30-40 feet high. It has a large round head; the leaves are broadly ovate, much longer than the petioles, woolly beneath, acute, crenate, and provided with glands; its flowers are always produced in sessile umbels, and are various in size, according to the variety. Some are almost as white as pear-bloom, but the great majority are either striped or tinged with rosy tints outside, and some are of bright carmine. All have a delicate



Branch of Apple with young Fruit:
a, piece of the blossom.

fragrance, much more refined than that of pear-bloom. The fruit is roundish, or narrowest towards the apex, with a depression at each end, generally green, but also frequently yellow, light red, dark red, streaked, sometimes even almost black, with the rind sometimes downy, sometimes glabrous, sometimes thickish, and sometimes very thin and transparent, varying in size from that of a walnut to that of a small child's head—the taste more or less aromatic, sweet, or subacid. It is produced on spurs which spring from branchlets of two or more years' growth, and continue to bear for a series of years. The fruit of the apple is, with regard to its structure, styled by botanists a *Pome* (q.v.). The eatable part is what is botanically termed the *mesocarp* (see *Fruit*), which, in its first development, enlarges with the calyx, the summit of the fruit being crowned in general by the dried quinquefid sepals; the *endocarp* being, when ripe, cartilaginous, and containing in its cells seeds which do not correspond with them in size, but are so free as sometimes to rattle when it is shaken. Dr Hogg has introduced a more scientific classification of varieties, according to the structure of the stamens, the tube, the carpels, and the sepals.

The apple is now one of the most widely diffused of fruit-trees, and for the general fruit-supply of Britain is the most valuable of all. It succeeds best in the colder parts of the temperate zone. It is, however, to be met with on the coasts of the Mediterranean Sea, in Arabia, Persia, the West Indies, &c., but there its fruit is as small and worthless as in high northern latitudes. The varieties in cultivation are by far too numerous. They have been classified with great care by German, French, English, and American writers, by whom the classification and description of apples, pears, and similar fruits has been made quite a matter of science, and entitled *Pomology*. Metzger, in his description of the pomaceous fruits of Southern Germany, describes 89 different kinds of apple, all of which are constant, besides sub-varieties. There are now at least 2000 varieties

cultivated in Great Britain, and perhaps twice that number, for many provincial sorts have as yet escaped the pomologist. New varieties are continually produced from seed; and as the apple is chiefly propagated by grafting—although some few can also be raised by means of layers and cuttings—the older varieties are superseded in many cases by newer ones. But some of the best kinds still in use can be traced back for centuries. The *costard*, from which dealers in apples received the name of costardmongers, still exists, though not largely grown, perhaps on account of the ribbed formation, from which it is believed to take its name, *pomum costatum*. Certain family divisions have been made, popular rather than correct, of apples (as of pears and plums)—e.g. Pippins, Codlins, Russets, Rennets, Pearmain, Calvilles, Crabs, &c. Some kinds, not approved for the dessert, are in high esteem as baking-apples, and others still more acid or austere are preferred for the manufacture of Cider (q.v.).

The apple is grown in Britain either as a standard, an espalier, or a wall-tree, and is variously trained. It was generally grafted on crab stocks, but now a dwarf variety, either the *Paradise* or *Doucin* stock, is largely used to restrict the growth and hasten the time of bearing; and trees thus dwarfed are often very productive when little larger than currant or gooseberry bushes. Some of the varieties of apple are more hardy than others, and are therefore to be preferred for cold or exposed situations. Some of the finest kinds succeed well only when the soil and climate are good. Some kinds are much earlier than others in flowering, some in ripening. It is a mistake to suppose that an early bloomer is therefore an early ripener. The converse is frequently the case with all fruit trees.

The wood of the apple-tree is hard, durable, and fine-grained. The crab is often planted both as an ornamental tree and for the sake of its wood. The bark contains a yellow dye. As a fruit tree, the apple requires a fertile soil and sheltered situation. The various uses of the fruit—for the dessert, for baking, preserving, making jelly, &c., as well as for making the fermented liquor called cider—are sufficiently well known. Vinegar is also made from it; and sometimes a kind of spirit, especially in Switzerland and Swabia. It contains *Malic Acid*, which is extracted for medicinal purposes. The fermented juice of the crab apple is called *Vergar*. It is used in cookery, and sometimes medicinally; also for the purifying of wax. Apples are an important article of commerce. Great quantities are imported into Britain, chiefly from France, Canada, and the northern parts of the United States. The apple keeps better than most kinds of fruit. *Beaufin* or *Biffins* are apples slowly dried in bakers' ovens, and occasionally pressed till they become soft and flat. They are prepared in great quantities in Norfolk.

The **SIBERIAN CRAB** is perhaps the parent by hybridisation or otherwise, of some of the varieties of apple now in cultivation. Two species partake this designation, both natives of Siberia, and frequent in gardens in Britain *Pyrus baccata* of Linnæus, and *Pyrus prunifolia* of Willdenow, which, however, scarcely differ, except that in the former the sepals (leaves of the calyx) are deciduous, in the latter they are persistent; a circumstance of very doubtful importance as a specific distinction. The fruit is sub-globose, yellowish, and rather austere, but is good for baking and for preserves.

The **AMERICAN CRAB** or **SWEET-SCENT'D CRAB** (*P. coronaria*) is a native of North America, especially of the southern part of the Alleghanies. It is a small tree with broad leaves and white flowers, becoming purple before they drop off, and

which have a powerful smell, resembling that of violets. The fruit is flatly globose, of a deep green colour, and sweet scented. It is very acid, but is made into cider, and also into preserves. *P. angustifolia*, a native of Carolina, much resembles this, but has much narrower leaves, and smaller fruit.

The **CHINESE CRAB** (*P. spectabilis*) is a small tree, a native of China. It is very ornamental when in flower; the flowers being in sessile, many-flowered umbels, and of a bright rose-colour. The fruit is irregularly round, about the size of a cherry, yellow, and fit to be eaten, like the medlar, only when in a state of incipient decay. See the *Report of the National Apple Congress* (1884); *The Herefordshire Pomona*, edited by R. Hogg and H. G. Bull, 2 vols. folio (Hereford, 1876-85).

Appleberry. See BILLAERDIERA.

Appleby, the county town of Westmoreland, on the Eden, 13 miles S.E. of Penrith. There is a castle, first mentioned in 1088, the keep of which, called Caesar's Tower, is still in tolerable condition. Appleby was disfranchised by the Reform Bill of 1832, but it received a new municipal charter in 1885. Pop. (1881) 2899.

Apple of Sodom. See SOLANUM.

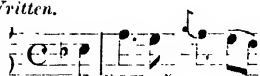
Appleton, a city of Wisconsin, U.S., 185 miles N. of Chicago, and 120 miles from Milwaukee by rail. It is noteworthy chiefly from its situation on the Grand Clute Rapids of the Fox River, which, with a descent of 30 feet in 1½ mile, affords immense water-power for flour, paper, and woollen mills. There are also manufactures of machinery. The city is the seat of Lawrence University (1847), a Methodist institution. Pop. (1880) 8005; (1887) about 12,000.

Appleton, CHARLES EDWARD, D.C.L., was born at Reading, 16th March 1841, and was educated at Oxford and in Germany. His reading was wide and varied, but he wrote little. He took a lively interest in the movement for the 'endowment of research,' and he founded in 1869 the *Academy*, whose special feature is its signed articles. He died at Luxor, in Upper Egypt, in 1879. See his *Life and Literary Relics*, by J. H. Appleton and A. H. Sayce (1881).

Appleton, DANIEL (1785-1849), the founder of the American publishing house of D. Appleton & Co., was born at Haverhill, Mass., where he commenced business as a retail trader. Removing to Boston, he afterwards settled as a bookseller in New York, and gradually built up one of the largest businesses of its kind in the United States. He retired in 1848 in favour of his three sons, of whom the last died in 1878. The success of the firm justified it in beginning, previous to 1857, the *New American Cyclopædia*, under the editorship of George Ripley and Charles A. Dana, which was completed in 1863, in sixteen volumes, at a cost of £100,000. A new edition was published in 1872-76. The same firm has issued many scientific and educational works.

Appogiatur'a ('leaning note'), an Italian musical term, designating a form of embellishment by insertion of notes of passage in a melody. The appoggiatura notes are printed in a smaller character than the leading notes of the melody, and should always be given with considerable expression. There are two species, the long and the short. The former is now seldom printed, the music being written as played; the latter is usually termed an *Acciaccatura*, and written with a short stroke across the stem of the note. The appoggiatura proper takes half its length from the note it precedes, except when preceding a dotted note, from which it takes a third. The following is an example:

Written.



Played.



Appointment. In a deed or will, power is often given or reserved to a certain person to appoint the uses to which property may be applied. Thus, a marriage settlement may contain a power of appointment, enabling the wife to distribute her property among the children of the marriage at her own discretion. The appointment when it is made derives its force, and the party in whose favour it is made derives his title, from the instrument in which the power of appointment is contained. The Courts of Equity give relief against a defective appointment, or defective execution of a power, where there is what is called a 'meritorious consideration' in the person applying for such relief. As to what amounts to such meritorious consideration, Lord St. Leonards, in his work on Powers, lays down that equity will relieve the following parties: (1) A purchaser, including in such term a mortgagee and lessee; (2) A creditor; (3) A wife; (4) A legitimate child; and (5) A charity. But in the case of a defective appointment by a wife in favour of her husband, there is no relief in equity; nor is the equity extended to a natural child; nor to a grandchild; nor to a father or mother, or brother or sister, even of the whole blood, much less of the half-blood; nor to a nephew or cousin. Against the legal consequences of an appointment, the Courts of Equity give no aid. See POWER.

In the Scotch law, the expressions *reserved power*, *faculty to burden*, and *faculty of distribution*, correspond to the English phrase 'power of appointment,' and the deed or instrument subsequently executed in virtue of the reserved power, is simply described according to the nature and quality of the conveyance so made; but the term *appointment* is not a technical word in Scotland.

Appomattox Courthouse, a village of Virginia, 20 miles E. of Lynchburg. Here General Lee, on April 9, 1865, surrendered the army of Northern Virginia, 27,805 men strong, to General Grant.

Apportionment may be stated to be this—that in the event of the termination of a life interest, by death, or of a more limited interest at a fixed period, the current rent or income shall be apportioned or paid over in such a way as to give the personal representatives of the party, or the party himself, as the case may be, a sum corresponding to the period that may have elapsed between the last date of payment and the death or other determination of the interest or estate. This was the effect of the Apportionment Act, 1834, which applies to the whole United Kingdom. It dealt chiefly with the cases of heirs of entail, life tenants, &c. The Apportionment Act of 1870 extends the principle to all rents, annuities, salaries, pensions, dividends, and other periodical payments, in the nature of income, so that all these now, like interest on money lent, are considered as accruing from day to day. When a person therefore dies, the income is counted up to the day of death, and is payable at the same time as the next quarterly or other payment would have been if no death had happened. The executor of the deceased, however, must recover the proportion, not from the tenant or debtor liable for the whole payment, but from the heir who receives it. Trade profits are not apportionable by virtue of the statute.

The word apportion is also used technically in English law to indicate (1) that a contract is divisible, so that a party may sue on one obligation, although he may not have performed all his obligations; (2) that a common of pasture may be divided proportionally among the owners of the common to which the pasture is attached.

Apposition, a term in Grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first: as, *My brother, the physician*; *Thomas the Rhymist*. Whole sentences or clauses admit of apposition: thus, 'Napoleon sought the way to India through Russia, a stroke of genius.' Sometimes a connecting word is used where logical propriety would require apposition: as, *the city of Bristol, for the city Bristol*.

Appraisement. An appraisement signifies generally any valuation of property; but in England the term is also used technically to denote a valuation by two sworn appraisers under a distress for rent. Where the value of the appraisement does not exceed £5, a stamp of threepence is required, and if over £500, the duty is £1; between these amounts *ad valorem* stamp-duties from sixpence to fifteen shillings are exigible. Appraisements are exempted from duty if they are made (1) For the information of one party only; (2) In pursuance of the order of any Admiralty Court, or Court of Appeal therefrom; (3) For the purpose of ascertaining legacy, succession, or inventory duties; (4) With reference to the property of a bankrupt; (5) For income-tax purposes.

An appraiser is a person licensed to make appraisements or valuations. The cost of the annual license is £2, but licensed auctioneers and attorneys require no special license. The appraiser is bound to write out the appraisement on duly stamped paper under a penalty of £50, and any person receiving or paying for an unstamped appraisement is liable to forfeit £20.

Apprehend. See ARREST.

Apprentice is a person described in law-books as a species of servant, and called apprentice, from the French verb *apprendre*, 'to learn,' because he is bound by indenture to serve a master for a certain term, receiving in return for his services instruction in his master's profession, art, or trade; the master, upon the other hand, contracting to instruct the apprentice, and, according to the nature of the agreement, to provide food and clothing for the apprentice, and to pay him small wages. The system of apprentices was incidental to the old craft guilds. Only apprentices were admitted to the freedom of the craft, and thus not only was monopoly secured, but a valuable organisation of the trade. In England the system was widespread and important, both in the early history of trade and from its later connection with the English poor-law system, under which apprenticeship gave a right of settlement. In Scotland the system never had the same importance, and now, except in one branch of the legal profession, apprenticeship is elementary. By a provision of the 5 Eliz. chap. 4, it was in general required that every person exercising a trade in England should have previously served as apprentice to it for seven years; but by later statutes, that provision was abolished, with a saving of the customs and by-laws in London and other corporations; and the term of apprenticeship is now determined by the mutual convenience of the contracting parties. By the Municipal Corporation Act, 1834, all such customs and by-laws as had the effect of prohibiting trades and occupations to persons who had not served as apprentices were also abolished. But in many trades the modern unions still practically enforce a law restricting the

number of apprentices, &c., and prohibiting the employment of those who have not served as apprentices. Apprentices, in general, are bound out by their friends, though with their own consent, testified by their executing the indentures, without which the transaction is not binding. To the same effect it is the rule of the Scots law that although a pupil may be a party to an indenture as an apprentice, yet he must have the concurrence of a parent or guardian, who alone can be liable to the master for the apprentice's non-performance of the engagement. An apprentice, on the other hand, who has passed the years of pupilarity, may effectually enter into an indenture by which he will be personally bound. It has been decided in England that the express assent of an infant apprentice to the indentures is essential to the contract. As a rule, writing is essential, and a cautioner or surety is generally required. Under the Stamp Act the indenture is void if the full consideration is not set forth. The apprentice is bound to enter the service and continue in it; and even after enlistment in the army, the apprentice, if under the age of twenty-one, may be reclaimed by the master by a proceeding before a justice of the peace. The master has also an action against any one who entices away an apprentice. The master is entitled to the apprentice's earnings. The apprentice must be obedient, diligent, respectful towards his master, and must behave decently and honestly; but the misconduct must be gross to justify dismissal. The apprentice must accompany the master on a change of residence. The master, on the other hand, must teach the apprentice his whole art and mystery. He must treat him properly, and provide him with medical attendance and medicine in sickness. He cannot assign the apprentice to another.

There is a special class of apprentices in England who are bound out by the guardians of the poor, and are called *parish apprentices*. Formerly the children of poor persons might, even without becoming parties to the indentures, be apprenticed out by the overseers with the consent of two justices (now by the guardians, without such consent), till twenty-one years of age, to suitable persons; and such persons might till 1844 be compelled to take them. But the reception of any poor child as an apprentice is no longer compulsory. A variety of statutes regulate the manner in which parish apprentices are to be bound, assigned, registered, and maintained. This is under the control of the Local Government Board, who make new rules from time to time, as they may think fit; and the justices of the peace are empowered to settle disputes between such apprentices and their masters, and to discharge the former from their indentures, upon reasonable cause shown.

An apprentice's indenture is terminable by the consent of all the parties to it; and also by the death of the master, or of a partner of the employing firm. In such cases a portion of the fee is generally returnable. On the death of the apprentice, however, the fee is not returnable. But the executor of the master may bind the apprentice to another master if the contract so provide; and he must also discharge any covenant or agreement for the apprentice's maintenance, so far as he has assets. By the custom of London, if the master of an apprentice die, the service must be continued with the widow, if she continue to carry on the trade. In other cases, it is incumbent on the executor to put the apprentice to another master of the same trade. The bankruptcy of the master operates as a discharge of the indenture of the apprentice, who, if he has paid an apprentice fee to the bankrupt, is entitled to be paid by the court a reasonable sum out of the estate. Apprentices not paying premium,

and whose premium was less than £25, are in general subject to the provisions of the Employers' and Workmen's Act, 1875—i.e. a court of summary jurisdiction may order the apprentice to perform his duties, and in default imprison him; may cancel the indenture and order repayment of premium; and may award damages up to £10 against either party or the cautioner.

By the Army Act, apprentices enlisting in the army, and conceding their apprenticeship when brought before a magistrate to be attested, may be indicted for obtaining money under *false pretences*; and if, after the expiration of their apprenticeship, they do not surrender to a recruiting officer, they may be apprehended as deserters.

Apprentices to the sea service are governed by the provisions of the Merchant Shipping Acts. Superintendents of mercantile marine shall give to boards of guardians, overseers, and others, all assistance in their power for facilitating the apprenticing of boys under their charge to the sea service. In the case of boys bound by guardians of the poor, the indentures must be executed in presence of two justices, who shall see that the boy has attained 12 years of age, has consented to be bound, that he is of sufficient health and strength, and that the master is a proper person for the purpose. Indentures to the sea service are exempt from stamp duty. Before each voyage abroad, the master must bring his apprentices and their indentures before a superintendent. See MASTER AND SERVANT.

In the United States, the system of apprenticeship has largely become obsolete; little account is taken of indentures and the serving of time. But most of the states have laws on the subject.

Approaches, in military language, are the sunken trenches or excavated roads which are constructed by besiegers. See SIEGE.

Approbate and Reprobate, a technical expression in the law of Scotland, which means that no one can be permitted to accept and reject (*approbate and reprobare*) the same deed or instrument. Thus, if a settlement purporting to dispose of real and personal property, which it directs to be converted into money and to be divided among the testator's children, should be invalid for the conveyance of the real estate, which, accordingly, becomes the property of the eldest son as his father's heir; the law does not permit the latter to enjoy such estate, and at the same time to take benefit under the will in other respects (for this would be simultaneously to accept and reject the same instrument). He must elect between the two alternatives, and either avail himself entirely of his rights at law, as heir, or claim his share of the whole estate according to the testator's manifest intention. In such cases the forfeited provision is generally applied in compensation to those legatees whose interests have been affected by the action of the heir; but when such compensation is fully made, there is no reason why the heir should not receive the balance of the provision. It must appear that the testator intended to impose a condition which was within his power, but this need not be stated in so many words. No legatee, however, is bound finally in such a matter unless he knows exactly how his interests are affected. The analogous doctrine in the law of England is called Election (q.v.).

Appropriation is the opposite of expropriation, and means making something the property of a particular person—e.g. game, which is the property of no one, is appropriated by capture; or one man is said to appropriate the ideas of another. The word has various important applications in law. (1) Where so much iron or oil, for

instance, has been sold, but the quantity is not separated by weight or measurement from a larger mass; or where a certain proportion is sold, but the exact quantity or price is not known until measurement, &c.; in such cases the risk of the goods perishing and the substantial ownership do not pass to the buyer. Before delivery, however, the goods may be appropriated so as to produce this effect. (2) When a bill is drawn against goods, and the bill of lading is sent as a security to the acceptor, the goods are said to be appropriated to the payment of the bill. (3) Where several debts are due to the same creditor, the debtor, in making a payment, may appropriate it to a particular debt. If he does not do so, the creditor may apply it as he pleases, e.g. to the least secured debt, or to interest instead of principal. Where the parties say nothing, the law appropriates the payments in order of date. Thus, in a banking account, the first item on the credit side is applied to the first item on the debit side, and so on. In church law, an appropriator is the owner of a benefice, e.g. the lay rector who receives the tithes, but is bound to appoint a vicar or perpetual curate for the spiritual service of the parish. In constitutional law, appropriation means the principle that 'supplies granted by parliament are only to be expended for particular objects specified by itself.' This principle was acted on by the *du* *the* wealth, was definitely established during the Dutch war of 1665, and since the reign of William III. has been expressed in the Annual Appropriation Act by a clause prohibiting the treasury officials from applying public money to any service other than that to which it has been specially appropriated.

Appropriation Clauses were an important feature in measures repeatedly proposed, and as often rejected, in connection with the agitation and legislation for the commutation of tithes in Ireland between 1833 and 1838. After the passing of the imperfect Commutation Bill of 1833, and the Irish Church Temporalities Bill, the House of Commons passed, in 1835, a resolution that the surplus revenues of the Irish Church, thus set free, should be 'appropriated' to the 'moral and religious education of the whole people, without distinction of religious persuasion.' A bill for commutation of tithes, recognising this principle, was passed by the Commons in 1836, but rejected by the Lords; and again in 1837. A last attempt was made in 1838 to include appropriation clauses, but was defeated; and a government measure, commencing tithes into a rent-charge of three-fourths of their amount, was passed without the debated clauses. See **TITHES**.

Approver, or **PROVER**, in the law of England, is a person who has been an accomplice in the perpetration of a crime, but who is admitted to give evidence against the prisoner. Formerly it was applied to one guilty of treason or felony who confessed on the promise of a pardon, conditional on the conviction of those whom he implicated.

The modern practice is to admit accomplices to give evidence for the prosecution or, as it is said to turn *Queen's evidence*, upon an implied promise of pardon, on condition of their making a full and fair confession of the whole truth. This assurance is generally given by the committing magistrate. The admission, however, of an accomplice to give evidence against his fellows requires the previous sanction of the judges of full delivery, and a motion is usually made at the trial to the judge for leave to admit the accomplice for that purpose, which leave is not given unless the evidence appears to be necessary, and likely to be

corroborated. The testimony of an accomplice is in all cases, however, regarded with just suspicion; and unless his statement is corroborated in some material part by unimpeachable evidence, the jury are usually advised by the judge to acquit the prisoner; and if the accomplice, after having confessed the crime, and being admitted as *Queen's evidence*, does not satisfy the condition on which he was so received by failing to give full information without equivocation, reservation, or fraud, he then forfeits all claim to protection, and may be tried, convicted, and punished on his own confession. The practice, however, is to direct an acquittal before the accomplice is examined, if he has been joined in the indictment.

The term in the law of Scotland analogous to that of approver is *socius criminis*, and the principles on which the socius is admitted, and on which his evidence is left to the jury, are the same as in England. But the criminal courts in Scotland give absolute protection to the socius who has been examined, after proper warning from the judge that what he says cannot be used against him. This privilege is altogether independent of the prevarication or unwillingness with which the witness may give his testimony. Justice, indeed, may often be defeated by a witness retracting his previous disclosures, or refusing to make any confession after he is put into the box; but it would be much more put in hazard if the witness was sensible that his future safety depended upon the extent to which he spoke out against his associate at the bar. The only remedy, therefore, in such a case, is committal of the witness for contempt or prevarication, or indicting him for perjury, if there are sufficient grounds for any of these proceedings. Attention was called in parliament to the law of Scotland in this matter, in connection with the case of Jessie McLachlan in 1863.

Approximation, a term commonly used in mathematical science to designate such calculations as are not rigorously correct, but approach the truth near enough for a given purpose. Thus in logarithmic and trigonometrical tables nearly all the numbers are mere approximations to the truth. The calculations of astronomy generally are of this nature. Even in pure mathematics there are parts in which approaches to the truth, by means of interminable series, are all we are able to gain. The solution of equations beyond the fourth degree can be got only by approximation.

Apraxin, **FEODOR**, **COUNT**, the creator of the Russian navy, and long the most powerful man in the court of Peter the Great, was born in 1671. Entering the navy, he rapidly rose to be admiral. In 1708 he defeated the Swedes; in 1710 he captured Viborg, in Finland; and in 1711 commanded in the Black Sea during the Turkish war. Again, in 1713, he conducted the war with Sweden so successfully that Russia was confirmed in her possession of Finland, just conquered, and of Esthonia. In 1714, however, and again in 1718, he was charged with responsibility in connection with embezzlement, tried, and condemned to pay a fine; but in spite of this and his opposition to many of Peter's reforms his services were too useful to be dispensed with. In 1722 he accompanied Peter in his Persian war. He died in 1728.

Apricot (*Prunus armeniaca*), a species of the same genus with the Plum (q.v.), is a native of Armenia, and of the countries eastward to China and Japan; a middle-sized tree of 15-20, or even 30 feet high, with ovate, acuminate, and cordate, smooth, doubly-toothed leaves on long stalks; solitary, sessile, white flowers which appear before the leaves, and fruit resembling the peach, roundish, downy, yellow, and ruddy on the side next the sun,

with yellow flesh. The apricot was brought into Europe in the time of Alexander the Great, and since the days of the Romans has been diffused over all its western countries. It has been cultivated in England since the middle of the 16th



Apricot (*Prunus armeniaca*).

century. It is only in the south of England that it is ever trained as a standard, nor is it grown in the more northern parts even as an espalier, but almost always as a wall-tree. More than twenty kinds are distinguished, amongst which some excel very much in size, fine colour, sweetness, and abundance of juice. The *Moorpark* is generally esteemed the finest variety, and the *Breda* as best suited for standards in the south of England, and in Scotland even for the wall, except in the most favourable situations. The apricot is generally budded on plum or wild cherry stocks. The fruit keeps only for a very short time, and is either eaten fresh, or made into a preserve or jelly. Apricots split up, having the stone taken out, and dried, are brought from Italy as an article of commerce, in particular from Trieste, Genoa, and Leghorn; in the south of France, also, they are an article of export in a preserved and candied state. Dried apricots from Bokhara are sold in the towns of Russia, the kernels of which are perfectly sweet, like those of the sweet almond. The kernels are sweet in some kinds, and bitter in others the bitterness being probably more natural, and the sweetness, as in the almond, the result of cultivation. Generally speaking, they may be used for the same purposes as almonds. From the bitter kernels, which contain Prussic acid, the *Eau de noyau* is distilled in France. The charred stones yield a black pigment similar to Indian ink. The wood of the tree is good only for the purposes of the turner.

The Briançon Apricot (*P. brigantia*) very much resembles the common apricot. The fruit is glabrous. It is found in Dauphiné and Piedmont. At Briançon, an oil, called *Huile de mar-motte*, is expressed from the seeds. The Siberian Apricot (*P. sibirica*) is also very like the common apricot, but smaller in all its parts. The fruit is small. It is a native of Siberia, especially of the southern slopes of the mountains of Dauria. The Apricot Plum is, as the name implies, not an apricot. It is an excellent kind of plum, which, in some parts of France, is preserved in sugar, dried, and extensively exported.

The older form of the name, *apricock*, best shows the descent of the word through Portuguese *albricoque*, Arab. *al* (the) *barqûq*, and late Gr. *praikokion*, from Lat. *præcoqua*, *præcox*, 'early ripe.'

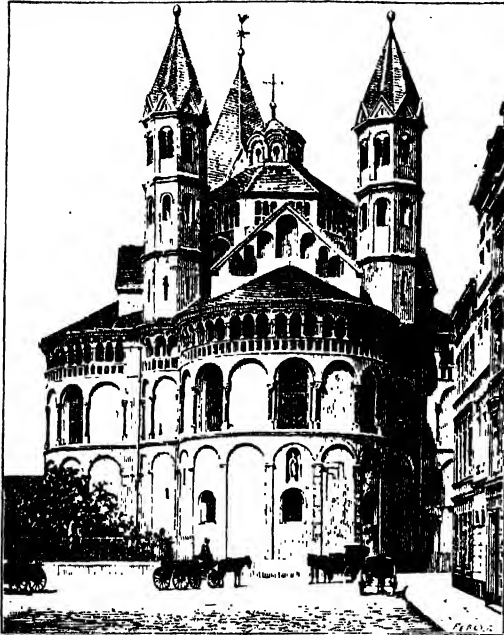
April. The Romans gave this month the name of *Aprilis*, derived from *aperire*, 'to open,' probably

because it is the season when the buds begin to open; by the Anglo-Saxons it was called Easter-month. The custom of sending one upon a bootless errand on the first day of this month, has been supposed to be a travesty of the sending hither and thither of the Saviour from Annas to Caiaphas, and from Pilate to Herod, because during the middle ages this scene in Christ's life was made the subject of a Miracle-play (q.v.) at Easter, which usually occurs in April. It is more probable that it is a relic of some old heathen Celtic festival. The custom, whatever be its origin, of playing off little tricks on this day, whereby ridicule may be fixed upon unguarded individuals, appears to be universal throughout Europe. It is believed that both England and Germany derived the custom from France. In France, one thus impudently called *un poisson d'Avril* (an April fish). In England, such a person is called an April fool; in Scotland, a gowk. Gowk is the Scotch for the cuckoo, and also signifies a foolish person. The favourite jest in Britain is to send one upon an errand for something grossly nonsensical; or to make appointments which are not to be kept; or to call to a passer-by that there is a spot of mud upon his face, or the like. When he falls into the snare, the term April fool or gowk is applied with a shout of laughter.

A priori. *A priori* reasoning, in Kant's use of the term, is that which rests on general notions or ideas, and is independent of experience; which is derived from the constitution of the mind, and is accordingly prior to all experience. But the word is used loosely in various senses; sometimes for reasoning from a general principle to its consequences; sometimes from observed facts to another fact or principle not observed; still more loosely for arguing from pre-existing knowledge, or even from cherished prejudices ('innate ideas' would be *a priori*). The Aristotelian usage made *a priori* reasoning from cause to effect; *a posteriori* from effect to cause. Now usually, reasoning from experience is called *a posteriori* reasoning. A predilection for one or the other of these forms of reasoning forms one of the most important distinctions among schools of philosophy. Plato and most of the great Germans may be taken as typical of the *a priori* school, Bacon and Locke of the empirical or experimental. *A priori* philosophy claims for its conclusions the character of necessary truths, and denies that there can be *a posteriori* proof of anything, that kind of reasoning furnishing only a confirmation or verification. The opposite school maintain that the general notions or principles on which *a priori* reasoning rests are themselves the results of experience, and that, therefore, all truth rests really on *a posteriori* grounds. Synthetic and analytic, deductive and inductive, correspond in a general way to *a priori* and *a posteriori*. See ANALYSIS, DEDUCTION, INDUCTION, LOGIC, TRANSCENDENTALISM.

Apse (Lat. *apsis*), a semicircular or semi-octagonal recess usually placed at the east end of the choir or chancel of all early churches, up to and including those of the Romanesque and Norman styles. The origin of this peculiar termination to the choir is generally supposed to be as follows. It is believed that the heathen structure from which the early Christians borrowed the form of their churches, was not the temple but the Basilica or public hall, which served at once for a market-place and a court of justice. The Basilica was generally a parallelogram, at one of the shorter sides of which, opposite to the entrance, there was a raised platform destined for the accommodation of the persons engaged in, and connected with, the distribution of justice. This portion of the

building was the prototype of the rounded choir, to which the name of apse was given. For the prætor's chair, which was placed in the centre of this semicircular space, the bishop's seat was substituted. This theory has, however, been disputed; Professor Baldwin Brown, of Edinburgh, maintaining that the apse was common to the *schola*,



The Church of the Apostles, Cologne.
(From a Photograph.)

or meeting-room, of the Christian and other guilds under the Roman empire, and contained the seat of the president (see *From Schola to Cathedral*, 1886). ApSES are to be met with in many English churches; but the structure is not only much more frequent, but continued to be used to a much later period on the Continent, and it may still be seen in almost every little village along the banks of the Rhine, and in the older churches of France and Italy. The lower part of the apse is usually pierced by two or three round arched windows, over which there is frequently an external arcaded gallery supported by small shafts; and the whole is joined to the end of the choir, which rises considerably above it, by a roof in the form of the segment of a cone. These features are all distinctly visible in the annexed illustration of the east end of the Church of the Apostles at Cologne, which is a typical example of Rhenish architecture. In this instance the transepts, as well as the choir, are terminated with round apses, thus producing a triapsal arrangement, similar to many churches in the East. The semicircular form of apse is of Roman origin, but many apses, especially in the south of France, are octagonal—a shape indicating a Byzantine influence. From 1100, some churches in Auvergne and the west of France began to adopt an aisle round the apse, and chapels were gradually introduced radiating from the aisle. These were ultimately developed in the 13th century into the splendid *choirs* of the great French cathedrals, such as Amiens and Beauvais. In Germany, numerous instances occur of churches with an apse at both the east and west ends. A few specimens are also found in the south of

France. The western apse is supposed to represent the baptistery, which was originally a separate round building, but was afterwards absorbed into the main edifice in this form. Several examples of the apse are to be seen in the earlier ecclesiastical structures of Scotland; as instances, we may mention the churches of Dalmeny and Leuchars.

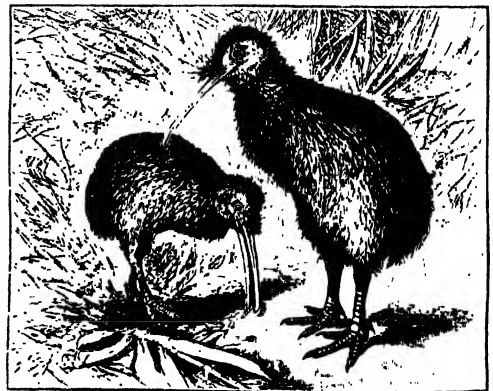
Apsheron, a peninsula on the west coast of the Caspian Sea, belonging to the Russian government of Baku. It is interesting for its volcanic condition, its burning naphtha wells, and its mud volcanoes. Its enormous petroleum industry is described at Baku (q.v.).

Ap'sides (Gr. *apsis*, 'connection'), the two extreme points in the orbit of a planet—one at the greatest, the other at the least distance from the sun. The term apses is also applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other farthest from, its primary; corresponding, in the case of the moon, to the perigee and apogee. A right line connecting these extreme points is called the line of apses. In all the planetary orbits, this line has no fixed position in space, but makes a forward motion in the plane of the orbit, except in the case of the planet Venus, where the motion is retrograding. This fact in the orbit of the earth gives rise to the Anomalistic Year (q.v.). This advancing motion of the line of apses is especially remarkable in the orbit of the moon, where it amounts to $40^{\circ} 40' 32'' \cdot 2$ annually, an entire revolution thus taking place in rather less than nine years. See MOON, PERTURBATIONS.

Apt (*Apta Julia*), a town in the French department of Vaucluse, 30 miles E. of Avignon. The cathedral dates from the 11th century. There are Roman remains in and near the town. Pop. (1881) 4260.

Ap'terous Insects are insects without wings. In the Linnæan system, the Aptera formed a distinct order of insects, and included a large number of incongruous forms. Many of these have been distributed to other orders, and the remainder—e.g. Collembola and Thysanura, are regarded as survivors of primitive forms. The term is now rarely used except as a descriptive adjective, equivalent to wingless. See INSECTS.

Apteryx (Gr. *a*, 'without,' *pteryx*, 'wing'), or KIWI, a genus of New Zealand birds, belonging to the sub-class Ratitæ, in which the breastbone has no keel. It is thus allied to the ostrich-like birds.



Apteryx.

It is usually about the size of a large hen, but some measure two feet or more in height. The colour is reddish-brown or gray. Though incapable of flight, it is not really wingless; the rudimentary stump,

with short humerus and one complete digit, is merely hidden by the downy feathers which thickly cover the body. The barbs of the feathers are not united, and there is no aftershaft (see FEATHER). The short, scale-covered legs are strong, and enable the bird to avoid its enemies by rapid running. The three anterior toes are armed with strong claws, used in scratching and as weapons, while the posterior fourth toe is short and raised from the ground. The long, slender, rounded beak, with the nostrils at its tip, is largely used for pulling worms out of the ground. The bones of the body do not exhibit the usual air-cavities found in flying birds. The apteryx lies during the day in holes in the ground, or at the foot of trees, and comes out in the twilight. They feed on worms, grubs, and also 'hinau berries.' They make a peculiar snuffing noise when hunting or feeding. They live in pairs, and the female lays, apparently twice a year, a very large egg, which is deposited in a hole at the foot of a tree or tree-fern. The male takes some share at least in the labour of incubation. Four species have been distinguished, two of which belong to the North Island, and two to the South Island of New Zealand. It is, however, somewhat uncertain whether the four forms are really distinct.

Apuleius, or **APPULEIUS**, a Latin satirist of the 2d century, was born at Madura, in Africa, where his father was a magistrate and a man of large fortune. Apuleius studied first at Carthage, and afterwards at Athens, displaying a special predilection for the Platonic philosophy. The fortune bequeathed to him at his father's death enabled him to travel extensively. He visited Italy, Asia, &c., and was initiated into numerous religious mysteries. The knowledge which he thus acquired of the priestly fraternities he made abundant use of afterwards in his *Golden Ass*. Having married a wealthy middle-aged lady, he was charged by her relations with having employed magic to gain her affections. His *Apologia*, still extant, was an eloquent and successful vindication of his conduct. After this event, his life appears to have been devoted zealously to literature and public oratory, in both of which he attained great eminence. The *Golden Ass*, the work by which his reputation has survived, is a romance, which is generally understood to have been intended as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though Bishop Warburton fancied he could detect in it an indirect apology for paganism. Its merits are great and conspicuous, as are also its faults. Wit, humour, satire, fancy, learning, and even poetic eloquence abound, but the style is disfigured by excessive archaisms and by a frequent affectation in the metaphors. The most exquisite thing in the whole work is the episode of Cupid and Psyche, Adlington's translation of which (1566) was republished in 1887, with a preface by Andrew Lang. Besides the *Apologia* and *Golden Ass*, we have from the pen of Apuleius an *Anthology*, a work on the *Demon* of Socrates, one on the doctrines of Plato, &c. There is a translation by Sir G. Head of the *Golden Ass* (1851), and of the entire works (1853), the best edition of which is by G. F. Hildebrand (Leip. 1843).

Apulia (modern *Puglia*), the south-eastern part of Italy as far as the promontory of Leuca, comprising the three provinces of Bari, Foggia, and Lecce, with an area of 8540 sq. m., and a pop. (1884) of 1,675,471. In ancient times it extended from the river Frento to the promontory Iapygium, and was bounded on the west by Samnium and Lucania, on the north by

the Frentani. More strictly defined, it was the country east of Samnium, on both sides of the Aufidus—the Daunian and Peucetia of the Greeks. The latter frequently applied the name Iapygia to include all Apulia. The inhabitants of Apulia formed three distinct peoples—the Messapians or Salentini, the Peucetii, and the Daunii or Apulians. Its principal cities were Arpi, Luceria, and Cannusium. They first appear in history as concluding a treaty with the Romans, in 326 B.C., against the Samnites; but this they soon after repudiated, and in 317 all the Apulian cities submitted to Rome. The second Punic war was for some time carried on in this province, the battle of Cannæ (216 B.C.) being fought within its borders, and many of its cities were severely punished by the Romans for siding with Hannibal. A like fate overtook them at the close of the social war in 89 B.C., and the district has never since recovered its ancient wealth and prosperity. It is but a shadow of its former self in the time of the Greek colonies, under Roman dominion, or even under the Normans, who made a duchy of it in 1043 A.D. Most of the towns are depopulated, and agriculture is in a very low condition. See Gregorovius' *Apulische Landschaften* (2d ed. Leip. 1880).

Apurê, a navigable river of Venezuela, which rises near the western boundary among the Eastern Cordillera, and flows nearly 1000 miles eastward, past the towns of Nutrias and San Fernando, till it falls by six arms into the Orinoco.

Apurimac, a river of Peru, also called *Tambo*, which, after a northward course of 500 miles, helps to form the Ucayali, and finally joins the Amazon, of which it is one of the most southerly tributaries. It gives name to a province of Peru, with an area of 62,325 sq. m., and a pop. (1876) of 119,246.

Aqua Fortis (literally 'strong water') was the term used by the alchemists to denote nitric acid, and is still the commercial name of that acid.

Aquamarine, a name sometimes popularly given to the Beryl (q.v.), as being 'sea-coloured.' Some green and blue varieties of topaz have also been so styled.

Aqua Regiæ (literally 'queen's water') is a mixture of concentrated sulphuric acid (oil of vitriol) and nitric acid, or of sulphuric acid and nitre. Either mixture evolves fumes largely, and may be used as a disinfectant.

Aqua Regis, or **REGIA** (literally 'royal water'), is the common name applied to a mixture of 1 part of nitric acid, and 2, 3, or 4 parts of hydrochloric acid. The general proportion is 1 to 2. The term aqua regia was given to the mixture from the power it possesses of dissolving gold, which is the *king of the metals*.

Aquarium, some contrivance on a large or small scale for keeping aquatic animals and plants alive out of their native habitat. Though the custom of keeping fish alive in tanks (*cicaria*) had been for long resorted to as a matter of domestic convenience, it is only since the middle of this century that the scientific and æsthetic value of aquariums has been appreciated. The Scottish naturalist Sir John Dalyell was one of the first (from 1790 onwards) to utilise simple aquariums for scientific purposes, and the almost historic long-lived sea-anemone 'Grannie' was one of his prisoners. In 1842 Johnston described the successful establishment of a small but well-peopled aquarium. Ward, Gosse, Warrington, and others did much to make both fresh-water and marine collections practicable and popular, and though the fresh enthusiasm of thirty years ago has to some extent died away, the number of public

and scientific aquariums has greatly increased. The large aquariums at Brighton and Hamburg are deservedly famous, and many others have been established both in towns for popular instruction and at the various zoological marine stations for purposes of scientific study. The first scientific and popular aquarium was that erected in the London Zoological Gardens in 1852. The Berlin Aquarium is a good instance of a well managed collection at a considerable distance from the sea, while that in connection with the Naples Zoological Station has proved a most valuable acquisition in studying the habits and life-histories of marine plants and animals. For detailed information, the reports of the Brighton Aquarium and the Naples station should be consulted.

Fresh-water aquariums, though less decorative and interesting, are on some scale possible to every one, while the ready importation of sea-water or its artificial preparation makes it quite feasible for even inland residents to keep marine plants or animals in good condition. Since 1841 various recipes have been given for the artificial preparation of sea-water -e.g. by mixing with rather less than 4 quarts of spring-water 3½ ounces of common table-salt, ½ ounce Epsom salts, 200 grains of chloride of magnesium, and 40 grains of chloride of potassium. Into this sea-lettuce (*Ulva*) and other seaweeds should first be placed. For a successful aquarium careful aeration is essential; and this is effected either simply by the aid of a syringe, or by mechanical contrivances of fountain, drip-glass, &c., and as far as possible also by regulating the proportion of plants and animals, since these compensate one another in their relations to the atmosphere. Abundant light and careful purification are also necessary. Dead specimens must be removed before decomposition, and the water filtered when it shows signs of losing its cleanness and fresh smell. Concentration of the sea water through evaporation, original impurities in the water (which is best conveyed in fir-wood or stoneware vessels), contamination by dust, overcrowding, and the like, must obviously be avoided. As to the stock, experience is the surest though slowest guide; but hints can be obtained by consulting popular works on marine plants and animals. Mr Gosse's *Aquarium* (1854), and more modern works, such as that of Hughes. Kingsley's *Glaucus* is also of permanent interest to beginners.

Aquarius ('the Water-bearer'), the eleventh sign of the zodiac, through which the sun moves in part of the months of January and February. See ZODIAC.

Aquatic Animals. Apart from any speculations as to the more or less watery nook where the first forms of life were cradled, it is worth noting that the home of almost all the simpler animals is distinctly and necessarily aquatic. While a few of the Protozoa, such as one of the *Amoebæ*, occur in damp places on land, or within other organisms, the vast majority live freely in the water, and the same is true of the Sponges, Coelenterates, and Echinoderms. Among worms, however, more emphatic exceptions occur, such as the earthworm, where the structure and habit of the animal has become distinctly adapted to terrestrial life. While the great majority of crustaceans again are aquatic, a few, such as the wood louse and the land crab, are modified for life ashore. The crowd of insects, spiders, and myriapods are of course terrestrial or aerial, though here also the habits of some adult forms, and the life of some of the young, are distinctly aquatic. Among molluscs also there is an equally familiar occurrence of both aquatic and terrestrial habit, while numerous forms illustrate

the transition from the former to the latter. The ascidians are exclusively marine. Some fishes have a limited power of life out of the water, the double-breathing Dipnoi (q.v.) being in this connection especially instructive. Among many amphibians, the transition from water to terra-firma is seen in the individual life-history, when the fish-like gilled tadpole becomes the lunged gill-less frog; while in a few exceptional cases, such as the black salamander of the Alps, the life is terrestrial from first to last, and even the young dispense with their preliminary swim as tadpoles, although a brief recapitulation of their aquatic life is still represented by a gilled stage within the body of the parent. The instance of the gilled Axolotl (q.v.) becoming, in the absence of sufficient water, the gill-less *Amblystoma*, forcibly illustrates the importance of the medium as a factor in evolution. Among reptiles there are numerous aquatic forms—chelonians, lizards, snakes, and crocodiles, though the absence of any gill-respiration marks the progressive general adaptation to terrestrial life. While an emphatically terrestrial amphibian like the tree-frog seeks a watery hole for the rearing of the young gill-breathing tadpoles, the habit is reversed in such reptiles as the sea-turtle, which having returned to the more primitive aquatic home, yet revisits the land for egg-laying purposes. The cradle of the young in both cases indicates the ancestral habit of the parent. Among the emphatically aerial birds, there are cases like that of the penguin, where the structure has become adapted to an almost exclusively aquatic life. And so among mammals, the sea-cow, the seal, and the whale are familiar illustrations of very different types which have returned to the primeval watery home and aquatic habit, with consequent change of structure.

To sum up the adaptations to aquatic life would obviously be to attempt to compress a large department of comparative physiology. It is more important simply to note the general fact that, in the water, animals are subjected to influences somewhat different in detail from those which mould their congeners ashore. Even contact with a different medium, varying in composition, in currents, in pressure, in contained food and oxygen, and the like, obviously involves a great diversity in structure. Modes of motion, from the swimming bell of a medusoid contracting and expanding in the tide, to that of the lowest vertebrates as illustrated in the pelagic Tunicates, or from the paddling of worm and crustacean to that of fish and frog, duck and seal, are at once familiar adaptations to, and necessary results of aquatic life. Similarly, the smooth and frequently fish-like form, especially of actively locomotive water-animals, is a very noticeable adaptive result of the conditions of life. In the more thoroughly aquatic animals, which have remained in the primitive environment, and have not merely returned to it, the blood is usually purified by being spread out on feathery gills which catch the oxygen dissolved in the water; while in terrestrial forms which have betaken themselves to an aquatic life, the ordinary direct air-breathing is still accomplished at the surface of the water, or in some isolated cases of insects and spiders, by means of the air entangled in their hairs, or even conveyed into their submerged homes. The aquatic respiration of some larval insects, the power that some crustaceans and fishes have of keeping up a respiration on land with a minimum of water about their gills, and above all, the cases of the double-breathing fishes or dipnoi, and of amphibians already referred to, are specially instructive in regard to the problem of transition from one medium to the other. The genuinely aquatic animals are known to have a body temperature not much higher than that of the surrounding

medium, and often survive even the freezing of the water; while in the higher warm-blooded vertebrates which have returned to an aquatic habit, various modifications, such as thick fur and plumage, waterproof varnish, formation of blubber, serve as protections against the cold. The sensitiveness of many forms to changes in the volume, movement, and composition of the water, the importance of the aquatic habit in relation to the dispersion of types, the power exhibited by some of the lower animals in avoiding death or at least extinction during drought, will be discussed in the articles on ENVIRONMENT, DISTRIBUTION, and DESICCATION.

Aquatic Plants. The presence of water is not only essential to the active life of all organisms, but is peculiarly necessary for plants which are for the most part dependent for food-supply on matter dissolved in water, as well as on the carbonic anhydride mingled with the surrounding medium. Numerous plants are, moreover, in the strict sense of the word aquatic, having never acquired or having lost all direct connection with the soil. The simplest plants or Algae are almost all aquatic, though many occur in damp situations on land, or on other organisms, while others remain for long periods quiescent in comparative dryness. Many Algae are absolutely isolated in the water, while others are more or less intimately fixed to some solid substratum. Fungi are very seldom found in water, and lichens are also emphatically terrestrial. Some Liverworts, again, occur floating in lakes, but the majority grow in very damp places, and mark the transition to the generally terrestrial life of mosses and ferns. Some Rhizocarps, such as *Salvinia*, are aquatic, with leaves rising to the surface, while others are land or marsh plants, like the higher horse-tails and club-mosses.

Among the flowering plants or phanerogams, a return to aquatic life is exhibited by numerous, though exceptional cases, while a very large number grow in moist situations, and have a semi-aquatic habit. The simple Monocotyledons known as Helobiae (q.v.) or marsh-lilies are more or less strictly water-plants. The Arrow-head, q.v. (*Sagittaria*), and other Alismaceae; the *Butorinus* of the marshes; *Hydrocharis*, with floating kidney-shaped leaves; the water-soldier (*Stratiotes*), with narrow submerged leaves; and the Canadian pond-weed (*Anacharis*, q.v.), which, though entirely flowerless in Europe, threatens to choke some canals and lakes, are familiar representatives. The little duck-weed (*Lemna*) floating on the surface of stagnant pools is one of the commonest aquatic Monocotyledons; and the pond-weeds (*Potamogeton*) found both in fresh and salt water; the lattice-plant (*Oncocorda*, see fig. 1), with its skeleton leaves; various estuarine and fresh-water Naiadaeans plants e.g. *Zostera* and *Najas*, are also common instances, while those growing in marshy ground are much too numerous to mention. Among Dicotyledons, the white water buttercup (*Ranunculus aquatilis*), with its slightly divided floating, and much dissected submerged leaves; the yellow and white water-lilies (*Nymphaea*); the sacred lotus-flower of the Ganges and Nile (*Nelumbium*); the gigantic *Victoria regia* of tropical South America; and the insectivorous bladderwort or *Utricularia*, are among the most familiar aquatic forms.

Numerous modifications have naturally resulted in adaptation to aquatic life. The roots growing out in a relatively frictionless medium may become, as in *Hydrocharis* and *Pontederia* (see Root), long and delicate, covered with numerous and uniform root-hairs, which thus expose a large absorbing surface. In *Utricularia*, on the other hand, where the whole plant is submerged with

the exception of the flower-stalk, root-structures are not developed at all. The leaf-stalks of a *Pontederia* growing in the water, show, when contrasted

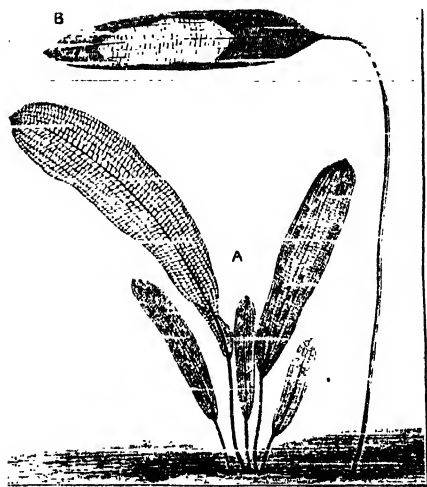


Fig. 1.

A, Madagascar Lattice-leaf (*Oncocorda furensalis*), showing open fenestrated leaves in adult state, with young leaves at first entire, and showing, as they develop, the progressive rupture of parenchyma between the fibro-vascular bundles ('veins').

B, Leaf of Pond-weed (*Apocynon*), to show floating type (entire) with same venation as *Oncocorda*.

with those of another growing on land, an enormous development of air spaces, which serve to buoy up the floating plant. Submersion seems to increase the surface of leaves at the expense of their thickness, and this in Monocotyledons usually

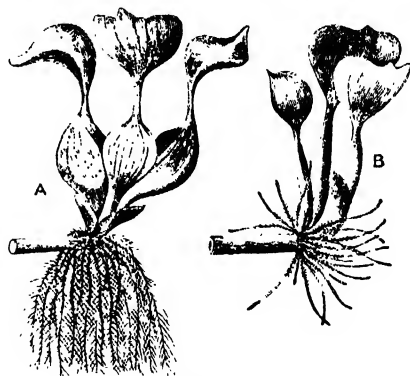


Fig. 2.

A, *Pontederia crassipes* of Amazons; ordinary floating form with air-spaces in leaf-stalks, and branched roots.

B, a runner which has taken root on land, and accordingly reverted to the ordinary form of root and leaf-stalk.

results in elongation in one direction (*Sagittaria*, *Vallisneria*, &c.), and in Dicotyledons, in the development of numerous capillary divisions, as in *Ranunculus aquatilis* and *Myriophyllum*. The change may sometimes be experimentally demonstrated by artificial change of environment, while the foliage of *Sagittaria*, *Alisma*, *Nuphar*, &c. is very different, according as the leaves are submerged, floating, or aerial. In aquatic plants, the Stomata (q.v.) are usually absent or scarce on the lower surface of the floating leaves, and on both sides of the submerged; and many more intimate

changes, such as the disappearance of hairs, the occurrence of chlorophyll in the epidermis, and so on, have been repeatedly observed to follow change to an aquatic medium. Some plants, such as *Zostera*, even flower under water, but an exposure and relative drying at the surface has been shown to be in some cases essential to the germination of the seeds. The fruits of the water-lily keep afloat by means of large air-spaces, and those of the arrow-head are protected by a thick oily rind. The whole subject of the adaptive modifications of aquatic plants is obviously a special case of the general problem of the relation between organism and environment, and for further details reference must be made to the separate articles on some of the plants cited as instances, and to ENVIRONMENT.

Aquatint, a mode of etching on copper, by which imitations of drawings in Indian ink, bistre, and sepia are produced. On a plate of copper a ground is prepared of black resin, on which the design is traced; a complicated series of manipulations with varnish and dilute acid is then gone through, until the desired result is attained. The process has fallen into comparative disuse.

Aqua Tofana, a mysterious poisonous liquid, applied to criminal purposes by a Sicilian woman named Tofana, about the end of the 17th century. Many wonderful stories are told of the great efficacy of this poison, but the best toxicologists believe that it was principally a solution of arsenic. See POISONING (*Secret*).

Aqua Vitæ (Lat., 'water of life') is a common term applied to ardent spirits; especially, in commerce, spirits of the first distillation, or unrectified. During the alchemical epoch, brandy or distilled spirits was much used as a medicine, was considered a cure for all disorders, and even got the credit of prolonging life. French *eau de vie* (brandy) has the same meaning, as well as our words *whisky* and *usquebaugh*: the former a Scotch, the latter an Irish form, from a common Gaelic and Irish, *uisge beatha*.

Aquaviva, general of the Jesuits, was born in 1543 of an old Neapolitan family, and died at Rome, January 31, 1615. Entering the order at the age of twenty five, he became its head thirteen years later. His principal work was the organisation of the body, and his ordinance regulating the studies of the Jesuits became famous under the title 'Ratio Studiorum' (Rome, 1586). His opinions are still regarded as authoritative by the order.

Aqueduct. This term is perhaps most commonly understood to mean a bridge of stone, iron, or wood, for conveying water across a valley. But a pipe, an open channel, or a tunnel through a mountain is equally an aqueduct, if its function is to convey water from one place to another. All great aqueducts have been constructed for the purpose of conducting water from some more or less distant source to large towns or cities. The term is also properly applied to a bridge carrying a canal for the purposes of navigation.

Roman Aqueducts. The aqueducts of the Romans were amongst the most magnificent of their works, and the noble supply of water which modern Rome derives from the four now in use, of which three are ancient, gives the stranger a very vivid conception of the vast scale on which the ancient city must have been provided with one of the most important appliances of civilisation and refinement, when nine were employed to pour water into its baths and fountains. The bridge portions of an ancient Roman aqueduct consist most frequently of one row of arches, but sometimes, as in the annexed figure (fig. 1), of two, and occasionally, when the height is great, even of three tiers. Some of these were built of hewn stone and others of brick, but

in nearly every case they were very substantially constructed. Several of them, indeed, after the lapse of two thousand years, have been put in repair and used again as modern aqueducts. The water-channel in one or two of the larger ones is about

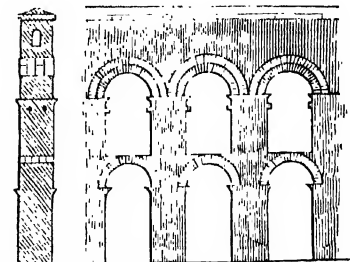


Fig. 1.—Aqua Alexandrina.

5½ feet high and 4 feet wide. This was, of course, formed in the upper part of the structure, above the arches, and was covered on top, bottom, and sides with a lining composed of lime, sand, and pulverised brick, which in time acquired the hardness of stone. The declivity of these ancient aqueducts was generally about 1 in 200, a much greater slope than is given to modern works of a similar kind. Reservoirs (*castella*) were built at regular intervals along the aqueducts to enable repairs to be made, and to supply water, where necessary, to the inhabitants of the outlying districts.

Of the nine aqueducts which brought water to ancient Rome, three still supply the modern city. (1) *Aqua Virgo*, now called *Aqua Vergine*, which was restored by Pope Nicholas V. in 1453. This name is said to have originated from a young girl having pointed out the spring at its source to some soldiers. The aqueduct was made by Agrippa, and finished about the year 27 B.C. It mainly consists of a subterranean channel 14 miles in length, and supplies daily about 13,000,000 cubic feet of excellent water. (2) The *Aqua Trajana*, restored by order of Paul V. in 1611, hence its modern name of *Aqua Paola*. It stretches from Rome to the lake of Bracciano, a distance of 31 miles. (3) The *Aqua Marcia*, constructed by the praetor Q. Marcus Rex in 146 B.C. This is 56 miles in length, and is very little shorter than the longest of the ancient aqueducts at Rome. It was restored so recently as 1869, and brings a supply of water from the Sabine Mountains. The noble arches which stretch across the Campagna for some 6 miles on the road to Frascati are a portion of this aqueduct. Besides these three repaired ancient aqueducts, a fourth of comparatively recent date supplies modern Rome. This is the *Aqua Felice*, completed by Sixtus V. in 1585, and largely built of material taken from the arches about 10 miles in length—of the ancient *Aqua Claudia*. The length of the *Aqua Felice* is some 13 miles, and two-thirds of it is subterranean.

Process of Roman Aqueducts.—Away from the capital there are a number of ancient Roman aqueducts in Italy itself. The ruins of one exist at Mayace, and of another near Metz, in Germany. France possesses, in the Pont du Gard at Nîmes (fig. 2), erected in the time of Augustus, one of the finest and most perfect of the aqueduct-bridges built by the Romans. It is higher than any about Rome itself, being fully 180 feet in height, and the length of its highest arcade is 873 feet. Spain has also interesting Roman works of this kind at Segovia, at Tarragona, and at Merida. The one at Évora, in Portugal, is still in excellent preservation.

Spoleto Aqueduct.—As forming a link between the ancient Roman structures and the great aqueduct-bridges of modern times, that of Spoleto,

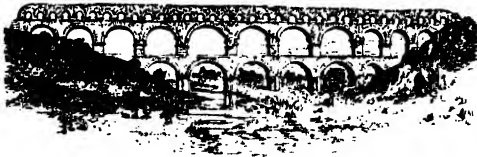


Fig. 2.—Pont du Gard, Nîmes.

about 60 miles to the north-east of Rome, should be mentioned. Erected in the 6th or 7th century, it serves both as a bridge and as an aqueduct, and is a wonderful piece of engineering for its time. The very tall piers are built of a durable stone, and the pointed arches are of brick. It is about 300 feet high, nearly 700 feet long, and the ten great arches have each a span of 66 feet. These are surmounted by a row of much smaller arches carrying the canal of the aqueduct. There exists some doubt as to whether the arches of this very interesting bridge are not of considerably later date than the piers.

Maintenon Aqueduct.—Many centuries elapsed before another aqueduct of special interest or importance was undertaken in Europe. In 1684 Louis XIV. set his engineers to construct an aqueduct to convey the waters of the Eure from Point Gouin to Versailles. Troops to the number of 40,000 were employed in this great undertaking. Thousands of these men died during the progress of the work, which was interrupted during the war of 1688 and never resumed. The bridge at Maintenon, forming part of this aqueduct, even in its incomplete state, is, in point of magnitude, the grandest structure of the kind in the world. The remains consist of forty-seven arches, each 42 feet wide and 83 feet high. The piers are 25 feet 6 inches thick.

Marseilles Aqueduct.—The aqueduct, 60 miles in length, which conveys water from the river Durance to Marseilles, is another magnificent specimen of French engineering. It was finished in 1847.

Croton Aqueducts.—New York is supplied with water from the Croton River, which falls into the Hudson. The aqueduct at present in use was constructed between the years 1837 and 1842. It is 38 miles long, with a declivity for the greater part of its course of 13½ inches to the mile. For a length of 33 miles the water-channel is 8 feet 5 inches in height, and 7 feet 8 inches in greatest breadth. Stone, brick, and cement are used for the encasing masonry, which varies slightly as the channel is formed in rock, or earth, or in an open cutting. In flat valleys the built conduit has sloping earth embankments on each side. When it reaches the Harlem River the water is conveyed in iron pipes over a splendid bridge. These large pipes also connect the receiving and the distributing reservoirs, which are two miles apart.

This first Croton aqueduct, though justly considered one of the grandest modern works of its kind, has been found to be totally inadequate for New York. Accordingly a new aqueduct on a more stupendous scale has been constructed since 1883. A dam of vast size is being built to collect the water of the Croton watershed, and for nearly the whole way—from this to the city, a length of 28½ miles—the conduit or water-channel is being tunnelled through solid rock. For the most part this channel is fully 13 feet both in height and width. A certain length of its more southerly portion, however, is quite circular in section, with a diameter first of 12 feet 3 inches, and then of 10 feet 6 inches.

Manchester Aqueducts.—Very large works were constructed during nine years, ending in 1877, to bring water from Longdendale, between Sheffield and Manchester, to the latter city. In this instance the aqueducts consist for the most part of tunnel and covered conduit, but for 8 miles the water is conveyed in large cast-iron pipes laid along or under the public roads. Before the Longdendale works were finished, the question of a greater supply had to be considered. This led to the adoption of the scheme for bringing water from Lake Thirlmere in Cumberland to Manchester. The distance is nearly 100 miles, and the works were begun in 1886. A tunnel, about 3 miles in length and 270 feet below the surface, forms the first part of the aqueduct, which is large enough to convey as much as 50 million gallons of water per day. Inverted siphon pipes are used for crossing the valleys, and the rivers are crossed by aqueduct-bridges. Cast-iron pipes, respectively 40, 36, and 33 inches in diameter, take the water from Bolton to Manchester. The estimated cost of this scheme is £3,500,000.

Loch Katrine Aqueduct.—Glasgow receives its water-supply from Loch Katrine by an aqueduct about 35 miles long. This great undertaking excited at least as much public interest as any other recent engineering work of the same nature has done. It was begun in 1855, and completed in 1860. The tunnelled portion is 13 miles in length, and is 8 feet high and 8 feet wide, with an inclination of 10 inches in a mile. It is capable of conveying 50 million gallons of water in twenty-four hours. Siphon pipes of cast-iron are laid across the valleys, having an inclination of 5 feet in a mile. The ravines are crossed by aqueduct-bridges of varying character. Where they are deep they are crossed by wrought-iron tubes, 8 feet wide by 6½ feet high, supported by stone piers 50 feet apart. Over small mountain-streams the aqueduct consists of cast iron troughs, supported on beams of the same material. In those portions of its course where suitable rock is abundant, some of the bridges are of freestone. There is one tunnel at the commencement of the aqueduct, near Loch Katrine, 2325 yards long, and at the other end, near Glasgow, the Mugdock tunnel is 2640 yards in length. The whole system of these waterworks cost about one million pounds sterling.

Liverpool Aqueduct.—Another aqueduct of great magnitude began in 1881 to be constructed for the supply of water to Liverpool from the river Vyrnwy in Wales. Its length from the intended Lake Vyrnwy to the Prescot reservoirs is 67 miles. It will consist partly of tunnel and partly of three parallel lines of iron pipes. The first (Hirnant) of the three chief tunnels is 2½ miles long, 7 feet in diameter, and has a gradient of 1 in 2340.

Vienna Aqueduct. This is one of the largest aqueducts which has been recently made on the Continent of Europe, and is nearly 60 miles long. It was finished in 1873. The springs are at the foot of the Styrian Alps, and are about 1150 feet above the level of the Danube at Vienna. The size of the section of the conduit or water-way varies, but it nowhere exceeds 6 feet 6 inches in height, by 4 feet in width. At several places in its course there are extensive aqueduct-bridges, and these are built either entirely of stone, or of stone and brick. One of the most important is Baden Bridge, which has forty-three arches. This aqueduct supplies 20 million gallons of water per day. It cost about two million pounds sterling.

Bombay Aqueduct.—A gigantic scheme has recently been determined upon for taking water from the Tansa River, at a point 60 miles from Bombay, into that city. The aqueduct will mainly consist of two lines of cast-iron pipes, 48 inches in diameter, which in this case will lie on the surface of the

ground. There no frost can injure them, and any leakage can be at once seen.

Canal Aqueducts. Of aqueduct-bridges for carrying navigable canals across rivers or valleys, the finest in Great Britain is that built by Telford over the Dee in Wales. Another fine bridge of this kind, designed by Rennie, crosses the river Lune. In Scotland there is one at Slateford, near Edinburgh, and another over the Kelvin at Glasgow.

Aqueous Humour, the watery fluid which fills the space in the eye between the cornea and the lens. See EYE.

Aqueous Rocks, rocks which owe their origin to the mechanical or chemical action of water. In some systems of classification, the term is synonymous with *sedimentary rocks*. See GEOLOGY.

Aquifolia'ceæ, the holly order, are corollifloral exogens allied to Rhamnaceæ, Celastraceæ, and Ebenaceæ. They are all shrubs or trees, and are chiefly natives of tropical and subtropical America. The most interesting species belong to the genus *Ilex*. See HOLLY, PARAGUAY TEA.

Aquila, the capital of the Italian province of the same name, beautifully situated on the Alterno, near the loftiest of the Apennines, 64 miles S.E. of Terni by a railway opened in 1884. It was built by the Emperor Frederick II. from the ruins of the ancient *Amiternum*, a town of the Sabines, and the birthplace of Sallust the historian. In 1703 it was almost destroyed by an earthquake, in which 2000 persons perished. Aquila, which is a bishop's see, is a busy place, and besides a large trade in saffron, which is the principal product of the surrounding district, the manufacture of paper, linen, and wax is carried on. Pop. (1881) 14,720. The province of Aquila is most picturesque, snow-topped mountains and smiling valleys alternating. Area, 2500 sq. m.; pop. (1885) 371,332.

Aquila. PONTICUS, a celebrated translator of the Old Testament into Greek, born at Sinope. He flourished about the year 130 A.D., is said to have been related to the Emperor Hadrian, and to have been first a pagan, then a Christian, and finally a Jew; submitting in his last conversion to circumcision. His translation of the Old Testament—which appears to have been undertaken for the benefit of his Hellenised countrymen—was so *literal*, that the Jews preferred it to the Septuagint, as did also the Judaizing sect of Christians called Ebionites. The version was praised by both Jerome and Origen, and such fragments of it as remain may be found in the latter's *Hexapla* (q.v.).

Aquilariaceæ. See ALOES WOOD.

Aquilegia. See COLUMBINE.

Aquileia (also *Aglar*) is a small town in Austria, at the head of the Adriatic, 22 miles N.W. of Trieste. Pop. about 1400. It is now sunk to utter insignificance, possessing no trade or public buildings of any note, except its cathedral; but in the time of the Roman emperors, it was one of the most important places north of the metropolis, and was a central point of the transit-trade between the north and south of Europe. Founded by a Roman colony in 181 B.C., it was so strongly fortified by Marcus Aurelius, as to be considered the first bulwark of the empire against the northern barbarians. Here the Emperor Maximin perished; and in the vicinity Constantius lost his life in a battle against his brother Constans. When the town was destroyed by Attila (452), it had 100,000 inhabitants. It never recovered, although it was rebuilt by Narses, but slowly dwindled into deeper obscurity. Councils were held at Aquileia in 381, 558, 698, and 1184 A.D.; its bishops called themselves patriarchs, and

claimed to rank next the pope. See Jackson's *Dalmatia* (1887).

Aquinas, THOMAS (or *Thomas of Aquino*), the prince of scholastic theologians, was of the family of the Counts of Aquino, and was born about 1226 in the castle of Rocca Secca, near Aquino, a small town of 3000 inhabitants, half-way between Rome and Naples. He received the rudiments of his education from the Benedictine monks of Monte-Casino, and completed his studies at the university of Naples. A strong inclination to solitude and the religious life determined him, against the will of his family, to enter (1243) the order of Preaching Friars founded by St Dominic, who had been dead twenty-two years. In order to frustrate the attempts of his mother to remove him from the convent, he was sent away from Naples, first to Rome and then to Paris; but his brothers took him by force from his conductors, and carried him to the paternal castle. Here he was guarded as a prisoner for two years, when, by the help of the Dominicans, he contrived to escape, and went through France to the Dominican convent at Cologne, in order to enjoy the instructions of the famous Albertus Magnus (q.v.). According to another account, he owed his release from confinement to the interference of the emperor and the pope. At Cologne he pursued his studies in such silence, that his companions gave him the name of the 'Dumb Ox.' But Albert is said to have predicted 'that this ox would one day fill the world with his bellowing.' In 1248, being 22 years of age, he was appointed by the general chapter of his order to teach at Cologne, together with his old master, Albert. He now began to publish his first works, commentaries on the ethics and the philosophy of Aristotle. In 1252 he was sent to Paris. His masterly application of this philosophy to the systematising of theology, soon procured him a distinguished reputation. It was not, however, till 1257 that Aquinas and his friend St Bonaventura, the Franciscan, obtained their degree of doctor, as the university of Paris, under the influence of William de St Amour, was hostile to the mendicant friars. He vindicated the principles of these orders in an important work; and, in a disputation in presence of the pope, procured the condemnation of the books of his adversaries. He continued to lecture with great applause in Paris, till Urban IV. in 1261 called him to Italy to teach in Rome, Bologna, and Pisa. It was at this time he composed most of his great works.

Even during his life Aquinas enjoyed the highest consideration in the church. His voice carried decisive weight with it; and his scholars called him the 'Angel of the Schools' or 'Angelic Doctor.' A general chapter of Dominicans in Paris made it obligatory on the members of the order to defend his doctrines. Both Urban IV. and his successor, Clement IV., who were much attached to Aquinas, pressed upon him the highest ecclesiastical dignities in vain. So great was his modesty, and his love of poverty and study, that he refused the archbishopric of Naples.

Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew, and was almost equally ignorant of history; but his numerous writings display an intellectual power of the highest order. He gave a new and scientific foundation to many doctrines of his church, especially that of transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the 'Father of Moral Philosophy.' The definiteness, clearness, and completeness of his method of handling theology were such that his *Summa Theologiæ*, which may be said to be the first attempt at a complete theo-

gical system, remains to this day substantially the standard authority in the Roman Church. Another important work of Aquinas is his *Summa contra Gentiles*, which deals chiefly with the principles of natural religion. His commentaries on Scripture and devotional treatises also have a high reputation. His influence on the theological thought of succeeding ages was immense. At the council of Trent, the *Summa* was honoured with a place on the table by the side of the Bible. It was at Bologna that he began this his greatest work, by which his name will always be connected, but which he never lived to complete. A legend tells how, when engaged in fervent prayer regarding this book, he heard the words from his crucifix: 'Thou hast written well of me, Thomas: what reward dost thou ask?' and he answered, 'None other but Thyself, O Lord.' On December 6, 1273, he was writing at 1 a.m. the 90th question of the third part of the *Summa*, when weakness of health compelled him to break off his studies. But Gregory X., who had called a general council to effect the union of the Greek and Latin churches, summoned Aquinas to defend the papal cause at Lyons, where the council was to meet on May 1, 1274. He set out, though suffering from fever, and was surprised by death on the road at the Cistercian abbey of Fossa Nuova, March 7, 1274. All Europe mourned his loss. Miracles were said to be wrought at his funeral. Universities, religious orders, and princes contended for the honour of possessing his body. It was finally bestowed by the pope on Toulouse, where it was received by 150,000 persons headed by Louis, Duke of Anjou. Aquinas was canonised by John XXII. in 1323, and proclaimed a 'Doctor of the Church' by Pius V. in 1567.

The only scholastic theologian who in any degree rivalled Aquinas in his own age, was the so-called 'Subtle Doctor,' Duns Scotus, of the order of St Francis. The Franciscans naturally followed Scotus, and the Dominicans Thomas, and henceforward medieval theologians were divided into two schools, Scotists and Thomists. The divergencies which penetrate more or less every branch of doctrine depend upon the different systems of metaphysics or scholastic philosophy upon which the theologies were based. The differences concerned the idea of God, the operations of grace and of justification, the mode in which the sacraments take effect, &c. Popularly, Scotism is best known for its advocacy of the Immaculate Conception of Mary, and for the doctrine, with which it is remotely connected, that the Incarnation would have taken place (though of course without suffering or death) if Adam had not sinned. The more recondite peculiarities of Scotist theology and philosophy are now almost entirely confined to the theologians of the Franciscan order. On the other hand, Thomism represents, with few exceptions, the general teaching of the Catholic Church. The school is now not so much opposed by the Scotists as by the eclectic school of Jesuit theology. The first complete edition of Aquinas's works was published in 17 vols. folio at Rome in 1570. They have been frequently reprinted, the latest and best edition having been begun in 1883 under the auspices of Leo XIII. The most convenient edition of the *Summa* is that of Migne (4 vols.), St Thomas was the author of the famous *Pange Lingua* (q.v.), and other eucharistic hymns of the Roman Breviary. See the *Life of St Thomas of Aquin*, by the Very Rev. R. B. Vaughan, O.S.B. (2 vols. 1872); and works by Otten (Paderborn, 1882), Leconte (Par. 1883), and Eucken (Halle, 1886).

Aquitania, the Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes, and by Celtic families who settled among them.

Augustus, when he divided Gaul into four provinces, added to Aquitania the country lying between the rivers Garonne and Loire. Afterwards it passed into the hands—first, of the West Goths, and then of the Franks; and during the Merovingian dynasty, became an independent duchy. Gascony, a duchy in the extreme SW., became in 1054, through the extinction of the male line, a part of Aquitania, which had come in the 10th century to be called *Gaunne*, a corruption of its original name. In 1137 it was united to the crown of France by the marriage of Louis VII. with Eleanor, heiress of Aquitania. In 1152 it became an English possession, through the marriage of Henry II. with Eleanor, whom Louis had divorced, and it remained an appanage of the English crown until, in 1452, Charles VII. finally united it to France by the capture of Bordeaux.

Arabesque (Fr.), a peculiar kind of fantastic decoration, either sculptured or painted, which the Spanish Moors are supposed to have introduced into modern Europe. But the species of enrichment to which this term is now

applied was extensively employed both by the Greeks and Romans, the latter in particular being masters of the style. The Egyptians, from whom the Moors probably derived their original notions of this and other forms of art, also employed it in their monumental decorations. The arabesque of the Moors entirely excluded the figures of animals, the representation of which was forbidden by the Mohammedan religion, and confined itself to the foliage, &c. of plants and trees, curiously and elaborately intertwined. This limitation was again departed from when the decorations were discovered on the walls of the baths of Titus, in the time of Leo X. More recently those in the houses at Herculaneum and Pompeii came to form the models of imitation, and the modern arabesque consists usually of combinations of plants, birds, and animals of all kinds, including the human figure, and embracing not only every natural variety, but stepping without hesitation beyond the bounds of nature. The arabesques with which Raphael adorned the galleries of the Vatican are at once the most famous and the most beautiful which the modern world has produced. See GROTESQUE, ORNAMENTATION.



Arabesque Panel.
(From the Mosque
at Cordova.)

Arabgir, or ARABKIR (anc. *Anabrac*), a town of Asiatic Turkey, in the province of Sivas, in a mountainous and rocky district, not far from the Euphrates, and on the caravan road from Aleppo to Trebizond. Pop. 30,000, nearly one-fourth Armenians, the rest Turks. It is to the enterprise and industry of the Armenians that the town owes its prosperity. It is specially noted for the manufacture of goods from English cotton yarn.

Arabia—called by the inhabitants, *Jezirat-al-Arab* (the peninsula of Arabia); by the Turks and Persians, *Arabistân*—is the great south-western peninsula of Asia, and is situated 12° 40' 34" N. lat., and 32° 30' 60" E. long. Its greatest length from NW. to SE. is about 1800 miles; its mean breadth, about 600; its area, 1,230,000 sq. m.; and its population conjectured to be not much above 5,000,000. It is bounded on the N. by the highlands of Syria, and the plains of Mesopo-

tamia (or by a line from El Arish on the Mediterranean to the Euphrates delta); on the E., by the Persian Gulf and the Gulf of Omán; on the S., by the Arabian Sea; and on the W., by the Red Sea and the Suez Canal. Midway between Mecca and Medina runs the tropic of Cancer. Ptolemy is supposed to be the author of the famous threefold division into *Arabia Petraea*—i.e. the Arabia of the city of Petra, in the NW.; *Arabia Felix* (an incorrect translation of Yemen, which does not signify 'happy,' but the land lying to the right—i.e. to the south of Mecca, Orientals regarding as the cardinal point not the north but the east), along the W. and SW. coasts; and *Arabia Deserta*, in the interior. The more precise divisions are: the *Sinaitic Peninsula* (see SINAI), between the Gulfs of Suez and Akaba; the *Hedjaz* (the Barrier), the larger and northern strip to the east of the Red Sea; *Yemen*, the southern and smaller strip to the east of the Red Sea; *Hadramaut*, the region along the southern coast; *Omán*, the extreme south-eastern end of the peninsula, as large as England and Wales; *El-Hasa*, along the Persian Gulf; *Nejd*, the Central 'Highlands' of Arabia.

In shape, Arabia is an irregular parallelogram, broadest at the southern end; in character, it is mainly African. The vast central plateau rises from a height of 2500 feet in the north to 7000 feet in the SW., and is bounded by western and southern mountain chains, the former attaining, to the south of Mecca, a height of 8500 feet. Between the mountains and the sea is a low hot strip of land, partially fertile, of varying width. There is a desert in the north of the interior, the mountainous country of Nejd near the very centre, and to the south of Nejd another very sterile sandy desert. Hedjaz and Yemen extend from the Red Sea indefinitely towards the interior, and consist partly of the *Tihāma*, or low country, along the sea, and partly of the mountain district beyond. Mecca and Medina, with their seaports Jiddah and Yembo, are in Hedjaz. Yemen is on the whole well watered, has rich and fertile valleys, and contains one-fifth of the whole population of Arabia. Yemen possesses two very important commercial towns, Mocha and Loheia, situated on the coast of the Red Sea. Hadramaut is little known, but resembles the Hedjaz in character. Omán is mainly mountainous, is partly very fertile, and possesses the good harbour of Muscat. It has considerable trade, and some manufactures of cotton, silk, and arms. Hasa is comparatively level and fertile. Large portions of Arabia are perfectly arid; nowhere does a river reach the sea all the year round; but the more fertile portions are so extensive as to constitute two-thirds of the total area; one-third of the whole may be accounted desert and uninhabitable.

Our knowledge of the interior of Arabia is still very imperfect in detail. The largest portion of it lies in that great desert zone which stretches from the shores of the Atlantic to those of the Northern Pacific. Nejd, the northern highland or central plateau of Arabia, is a compact settled district, culminating in the crescent-shaped Jebel Toweyk, which is intersected by numerous valleys, roaring torrents during the rains, but dry depressions at other times. North of Nejd, and separated from it by a narrow arm of Nefud, or the northern desert of Arabia, is the smaller plateau of Jebel Shomer, crossed by the ranges of Jebel Aja and Jebel Selma. The northern desert, partly stony, and partly a burning expanse of red sand, is thinly sprinkled over with oases of wells and grass, serving as halting-places for the caravans of merchants or pilgrims. The oasis of *Jarf*, 60 miles long by 10 miles broad, contains 40,000

settled inhabitants. *Dahna*, the southern and main desert of Arabia, extends from Nejd to the Hadramaut coast-range, and has never been explored by any European. It is, however, an almost absolutely sterile sand-waste. See MUSCAT, ZANZIBAR.

Politically, Hedjaz, Yemen, and El-Hasa are really three Turkish provinces; the Sinaitic Peninsula is in Egyptian hands; England exercises much influence in Hadramaut through her possession of Aden; the Sultan of Omán is independent, and in alliance with England; Nejd, the seat of the once powerful Wahabi State (see WAHABIS), is independent. The Emir of Shomer or Shanmar pays a small annual tribute to the Sherif of Mecca, in recognition of Turkish supremacy.

Arabia has, on the whole, an African climate. Though it is surrounded on three sides by the sea, its mountain chains exclude in a great measure the modifying influence of currents of air from the ocean. In several parts of Arabia hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown; in other sultry districts, the date-palm is almost the only proof of vegetable life. Over large sterile tracts hangs a sky of almost unbroken serenity. The short rainy season which occurs on the west coast during our summer months, fills periodically the *wadys* (hollow places) with water, while slight frosts mark the winters in the centre and north-east. During the hot season, the Simoom (q.v.) blows, but only in the northern part of the land. The terraced districts are more favourable to culture, and produce wheat, barley, millet, palms, tobacco, indigo, cotton, sugar, tamarinds, excellent coffee, senna, and many aromatic and spice plants, as balsam, aloe, myrrh, frankincense, &c. Arabia is destitute of forests, but has vast stretches of desert grass fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product both of Arabia and Africa.

In the animal kingdom, an African character prevails generally. Sheep, goats, oxen, camels, and horses are abundant among the settled inhabitants; the wandering tribes have no oxen. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, and flocks of locusts often make sad devastation. Fish and turtle abound on the coast. The noble breed of Arabian horses has been cultivated for several thousand years. The best are reared in Nejd; they never reach the European market. But the most characteristic of all animals in the peninsula is the camel, which has been both poetically and justly styled 'the ship of the desert.' It may be regarded as an Arabian animal, for it seems to be proved that it is not a native of Africa, but has migrated from the peninsula with its master. The camel is not found among the figures of animals in the ancient Egyptian paintings on walls, nor does it appear to have been known to the Carthaginians. The breed of Omán is celebrated for its beauty and swiftness. Among the minerals of Arabia may be mentioned—iron, copper, lead, coal, basalt, and asphaltum, and the precious stones, emerald, carnelian, agate, and onyx. Pearls are found in the Persian Gulf, where, on the island Bahreyn, in the town Bédáa, and on the coast adjoining it, 'all are slaves to one master, Pearl.'

But the most interesting feature of the peninsula is its ancient and peculiar population. The Arab is of medium stature, muscular make, and brown complexion. Independence looks out of his glowing eyes; by nature he is quick, sharp-witted,

imaginative, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of rapacity and sanguinary revenge. His wife or wives do the work, keep the house, and educate the children.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouin, who have, however, their allotted winter and summer camping-grounds, and a strong attachment to their own mode of life, entertain notions of the rights of property differing seriously from those regulating the West; yet even their most marauding tribes are not without a traditional code of law and honour, the only law recognised among them; the enforcing of it is left to every tribesman. The settled tribes, styled Hadesi and Fellahs, are despised by the Bedouin, who scorn to intermarry even with the few artisans that accompany every tribe. The Bedouin are several times outnumbered by the settled population, and therefore must not be regarded as normal Arabs, who are adventurous, commercial, and willing to become sailors. Yet mountain and desert barriers and patriarchal anarchy make Arabia the 'anti-industrial centre of the world,' where passing centuries bring no improvements save such as are forced on it by foreigners. The export of coffee, dates, figs, spices, and drugs, though still considerable, is said to be only a shadow of the old commerce which existed before the circumnavigation of Africa. Arabia has few manufactures, but carries on a transit-trade in foreign fabrics, besides importing these to some extent for its own necessities. Education is mostly confined to that within the household, where, however, a boy is instructed in reading and writing, in grammar, history, and poetry, and where he is trained to habits of politeness and self-restraint. In the few higher public schools, writing, grammar, and rhetoric compose the whole curriculum. The government is patriarchal, and the chief men of the various tribes have the title of Emir, Sheikh, or, in a religious sense, Imâm. Their function appears limited to leading the troops in the time of war, to levying tribute, and to the administration of justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been infrequent both in early and modern times.

History.—The Arabs are of two main races. The one occupying the north half of the country is conveniently called the Ishmaelite; the other, covering the southern half, is called the Yoktanie if we use the Hebrew word—the Kahtanie if we use their own—and is in Arabia regarded as the pure old Arab stock. The origin of the Kahtanites is probably African. In prehistoric times they issued from Yemen, the most highly civilised part of the peninsula, in powerful colonies to Omân and Central Arabia.

If blessed is the country that has no annals, peculiarly blessed was Arabia before Islam, for then 'the history of the Arabs was the songs of the bards.' In 24 B.C. Julius Gallus, prefect of Egypt under Augustus, attacked Yemen unsuccessfully. Trajan appropriated some extreme northern parts bordering on the empire, but they were restored after his death. Persia, too, intruded over the nearest frontier. In the 4th century the Abyssinians invaded Yemen, not for the first time and they long ruled it. Again, in 529, a large Abyssinian army subdued Yemen, and held their ground for 76 years. But Hedjâz, the Barrier, proved impenetrable against Persia, Egypt, Rome, and Byzantium. The Arabs lived then more after the manner of the Bedouins at the present time, in tents of hair or woollen cloth, following the

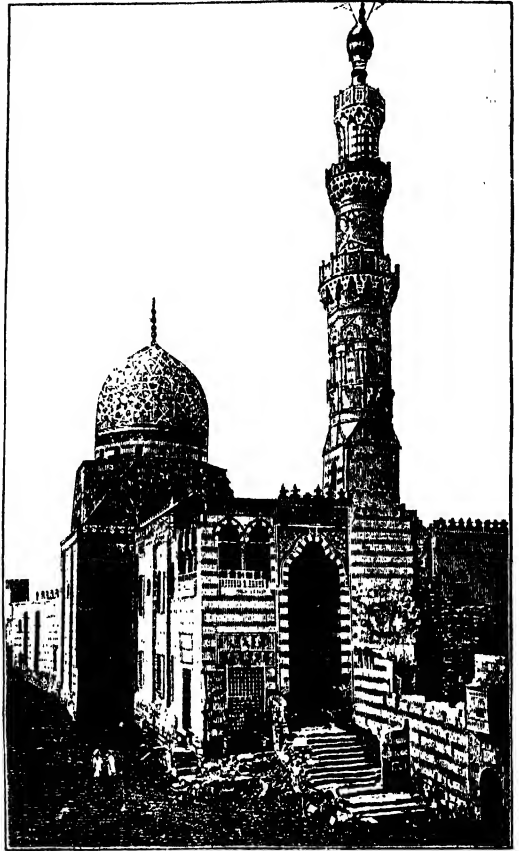
pasture, exchanging sheep for what corn they needed; their wealth consisting in camels, sheep, horses, and slaves. Government was not, but sheikhs chosen from certain families led the camps. The usage of blood revenge, calling out the kin of the slain against the kin of the murderer, punished or prevented homicide, and thus precluded alike peace and extermination. Gambling and drunkenness were common. Polygamy, and the husband's absolute power of divorce, the common practice of burying female children alive, and many old proverbs, as 'The best son-in-law is the grave,' illustrate the position of woman. Arabs were incurably prone to pillage, passionately fond of freedom, proud of birth, hospitable, true to their word, true to their tribe or to a tribesman, right or wrong, against the world. Scarcely ever was any tribe at peace with all its neighbours. But one bond of union was the annual fair of Okâdh, near Taif, a day's journey west from Mecca, which lasted all the pilgrimage month, and at which horse races, gymnastic sports, and poetic contests relieved the seriousness of trade. Mohammed, to prevent the feuds kindled by these contests, put an end to the fair. Another bond was the Kaaba, the small rude temple of unknown antiquity at Mecca, wherein the tribal idols were collected. In Mohammed's youth, these numbered 365. Late in the 5th century the Koreish tribe became foremost at Mecca, and guardians of the Kaaba. This post had ever been an object of rivalry and war among the tribes of both north and south, giving not only a religious pre-eminence over all Arabia, but the disposal of the offerings of gold, silver, or of other kinds, accumulated in the temple, a fund which was increased by commerce on the Red Sea coast. To religion, destined to play so decisive a part in Arabian history, Arab nature is not much addicted. Before Islam, the primitive Sabæanism was forgotten, or miserably degenerate; the tribal idols, stones, fetiches of simplest kinds, and jinn, were worshipped, and Allah, 'the God,' was vaguely acknowledged. But two monotheistic religions had cast roots among the tribes. Many Jews had immigrated into Arabia after the destruction of Jerusalem, and had made many proselytes, especially in Yemen, whither the Abyssinian conquerors had, in the 4th century, brought Christianity. In north Central Arabia this religion had found earlier access. In Mecca, Mohammed was born of the Koreish tribe in 571, the year of the Elephant, when the Abyssinians of Yemen had brought elephants to the unsuccessful siege of Mecca. Taught by the merits and shocked by the corruptions of those two religions, and by the lack of anything better, he, after a while, introduced by the sword his own doctrines, thus forming the grand epoch in Arabian history, and bringing Arabia into close connection with the general history of civilisation. His flight (Hedjrah) in July 622, on being driven from Mecca to Medina, where he gathered his first body of adherents, forms the Moslem era. Now, for the first time, the people of Arabia became united under one sceptre and one creed, and powerful enough to erect new empires in the three quarters of the world: in Palestine, Mesopotamia, and Persia; in Egypt and the north of Africa; in Spain. The dominion of the Arabs, from the time of Mohammed to the fall of the Caliphate of Bagdad in 1258, or even to the expulsion of the Moors from Spain in 1492, is an important period in the history of civilisation (see MOORS, CALIF). But the movements that had such great effects on the destinies of other nations, left the peninsula itself in an exhausted and neglected condition. The monotonous darkness and storms of patriarchal anarchy are broken during the next

thousand years by few events of importance. The invasion of Abū Taher, leader of the Carmathian sect (died 950), from the Euphrates, left no remnant of the califate, and little of orthodox Islam. Arabia was broken up into several independent principalities. The Turks subdued Yemen in the 16th century, and were expelled in the 17th. Omán, during the 16th and 17th centuries, was in the hands of the Portuguese, who held Muscat and other important points on the coast, 1508-1659; of the Dutch, who gained and lost many points; and of the Persians, who were driven out by the native prince Ahmed ibn Sa'ood, in 1759, who thus became Sultan of Omán. About 1760, Mohammed-ibn-Abd-il-Wahháb, in Nejd, came forward as restorer of primitive Islam. The sword of his convert Prince Sa'ood gave the Wahábis dominion from the frontiers of Mecca to the Persian Gulf. After his death, Mecca and Medina were soon added. The Wahábi empire was shattered (1812-18) by Mohammed Ali, viceroy of Egypt, but almost immediately restored itself. Omán, however, had seized the opportunity to regain independence under its native sultan. It is now the most progressive part of Arabia, and contains about 1,500,000 settled inhabitants. Shomer, to a considerable extent Christian, had, in the beginning of the 8th century, successfully resisted the Omniade (Ommyyad) Califs; had thereafter probably become nominally Moslem, then really heathen; was absorbed by the Wahábis, and freed itself when they fell. Its settled population is now about 275,000; the capital is Hayel. The Jowf had been early converted by the sword from some measure of Christianity to Islam; had soon thereafter gravitated into primeval heathenism; became the Wahábi empire's northern limb, and then quietly a province of Shomer. Hasa also freed itself, but, after an obstinate resistance, was reconquered. It is now Turkish. Nejd, the remaining Wahábi domain, has more than a million of settled inhabitants; its capital is now Riád. After Mohammed Ali's short independence, Yemen and the Hedjaz were restored to Turkey by treaty in 1841.

Authorities on Arabia are Pococke, Niebuhr, Burckhardt, Burton, Palgrave, and Welsted.

Arabian Architecture. Before the time of Mohammed, and for long after, the Arabs or Moslems had no special architecture. They were not a temple-building people, but from their intercourse with the western nations they acquired a desire to give their religion a visible embodiment, like the churches of the Christians. Having no architects of their own, they had to engage architects and workmen from Byzantium; and their earliest mosques were thus erected in the style of the late empire, but of course the dispositions of the buildings were adjusted to suit the requirements of their worship. By degrees, the court usually placed in front of the Christian church became enlarged and surrounded with arcades, while the church was diminished in size and importance, and was represented merely by a deeper arcade. Such are the early mosques of Cairo, erected during the first two centuries of the Hedjaz, between 622 and 900 A.D. It is noticeable that in these buildings the arches are all of the pointed form, which seems to have been of very ancient use in the East. This was afterwards modified into the horseshoe shape which is peculiarly characteristic of Saracenic art. Gradually a new and fanciful ornamentation known as Arabesque (q.v.) was added to the recognised features of Greek and Roman edifices. The exclusion of animal figures, which their abhorrence of the very appearance of idolatry necessitated, confined the Mohammedan artists to the imitation of vegetable productions, varied by geometrical patterns

and inscriptions, of which the letters were woven into forms which suited them for architectural uses. At first Saracenic art partook largely of the



The Mosque of Kait Bey, Cairo.
(From a Photograph by Frith.)

styles of the countries into which the Mohammedan religion was introduced, but gradually a style more or less homogeneous was evolved, of which fine examples are found in Persia, India, Africa, and Spain, and of which the influence continues to the present day. In India, this style finds expression in the magnificent tombs of the Tartar rulers, with their wonderful domes and graceful minarets (see AGRA). The gateways are also features of great size, on which much ornament is usually displayed. In Spain, the Moors erected many important buildings, from the mosque of Cordova, begun by Abdel-Rahman in 786, which resembles those of Cairo in general idea, to the Alhambra at Granada, erected in the 14th century during the decadence of the Moorish rule. Many of these structures, although beautiful and elaborate in design, are unfortunately built with brick and stucco, and have yielded to the influence of time. The style of the Moors, after their expulsion from Spain, long continued to influence that of the Christians, especially in the southern part of that country.

Arabian Gulf. See RED SEA.

Arabian Language and Literature. Regarding the oldest literary culture of the Arabians, we possess but slight information. As far back as Solomon's time, the queen of Sheba (probably *Arabia Felix*) was noted for her skill

in enigmas. The nomadic tribes, living under the patriarchal rule of their sheikhs, possessed everything that was favourable to the growth of a simple and natural poetry. They had quick and vivid feelings, and a rich, glowing fancy, which, operating upon the perils, the hardships, and strange confederate life they led in those barren sand-deserts, and among naked rocks, could hardly fail to call forth a wild and vigorous minstrelsy. Before the time of Mohammed, the Arabians had celebrated poets who sang the deeds of tribes, and the praises of heroes and fair women. During the great fairs at Mecca and Okâdh, poetic contests were held before the people as at the Grecian games; and the poems to which the prize was awarded were re-written in golden characters, and suspended in or on the Kaaba at Mecca, and are therefore termed *Moul-lakât*, 'suspended.' They are remarkable for their pathos, soaring conceptions, richness of imagery and phraseology, free and unconstrained spirit, and the glow of their love and hate. Among the famous poets of this early period are Nâbegha and others, whose works were translated and published by De Sacy in his *Chrestomathie Arabe*, and Kaah-ben-Zohair, who lived to celebrate the praises of the prophet Mohammed.

But Arabian literature began a new career with Mohammed, though his Korân contains not one precept favourable to literature or science. During the first eighty years of their conquests, when they had extended their dominion from Egypt to India, and from Lisbon to Samarcand, nothing can be said of their culture and refinement. A fanatical desire of conquest prevailed. Gradually, however, the taste for elegant pleasures arose during the repose that followed conquest, and the conquerors served themselves heirs to the civilisation that was perishing around them. With the Abbasside califs, literature, science, and art arose (750 A.D.); when the califate fell (1258), they entered on their decline. They were generously fostered under the splendid sway, first of Ahmansor (754-75), and afterwards of the celebrated Haroun Al-Raschid (Harûn Al-Rashid, 786-808). Learned men were invited to their courts from many countries, and remunerated for their labours with princely munificence; the works of the best Greek, Syriac, and old Persian writers were translated into Arabic, and spread abroad in numerous copies. The Calif Al-Mamûn, who reigned from 813 to 833, offered to the Greek emperor five tons of gold and a perpetual treaty of peace, on condition that the philosopher Leo should be allowed for a time to give him instruction. Under the sway of the same Al-Mamûn, excellent schools were founded in Bagdad, Basra, Bokhara, and Kufa; while large libraries were collected at Alexandria, Bagdad, and Cairo. In Spain, the high school of Cordova rivalled the literary fame of Bagdad, and generally, in the 10th century, the Arabs appeared everywhere as the preservers and distributors of knowledge. For this period of Arab glory corresponds exactly to that of Europe's deepest darkness, when Italy had no philosopher but the French pope, Sylvester II. (died 1003), whose learning, obtained from the Arabs of Cordova, earned him the name of necromancer. Pupils from France and other European countries then began to repair to Spain in great numbers, to study mathematics and medicine under the Arabs. There were fourteen academies, with many preparatory and upper schools in Spain, and five very considerable public libraries. When 300 volumes were a great library for a rich monastery, the library of the Calif Hakem II. of Spain (died 977) contained, it is said, more than 600,000 volumes. This state of culture, when compared with that prevalent before Mohammed, shows a rapidity of

progress in knowledge almost as remarkable as the career of Arabian conquest.

The Arabs despised the languages of Greece and Rome, abhorred their poets for their heathenism, and disliked their temperate dignity of style; but in science the Arabs were willing learners, and rendered important services. Arabic words still employed in science such as algebra, alcohol, azimuth, zenith, nadir, with many names of stars, &c. - remain as indications of their influence on the early intellectual culture of Europe. But geography owes most to them during the middle ages. Conquest, widened political connection, trade and the duty of pilgrimage, impelled them to this study. The old Arab treatises on geography, and works of travels in several countries by Ibn Fodhlân (died 921), the fugitive African calif, Edrisi (circa 1153), Ibn Jolair (died 1217), Abulfeda, prince of Hamath (died 1331), Ibn Batuta (died 1377), Albiruni the historian, and others, are still interesting and valuable.

Of what happened in the world before Islam, the Arabs cared to know nothing but the lives of the patriarchs and prophets, and a little of Persian history; but the history of the world after Islam arose was studiously cultivated. After the dawn of the 10th century, history became a favourite study of the Arabs. The first that attempted a universal survey of the subject were Masûdi (died 957), in his *Golden Meadows*; the Persian Tabârî (died 923), whose annals, of great bulk and value, were in 1887 in course of publication by De Goeje and others in Leyden; and Eutychius, Christian patriarch of Alexandria (died 950). These were followed by Abulfaraj or Bar Hebraeus, philosopher and also theologian, 'the phoenix of his age;' and George Elmakin (flourished in Egypt in the 13th century), both Christians; Abulfeda; Nuvairi, who wrote a cyclopædia (circa 1331); Makrizi, who wrote the history of Egypt (died 1441), and others. See Wûstenfeld's *Geschichtsschreiber der Araber* (1882), and translations by Quatremère.

Arabian theology and jurisprudence are intimately connected, and both founded on the Korân; but are by no means so simple and uniform as is generally supposed. Speculation first began to prevail during the Omniade dynasty, and the Aristotelian philosophy to be studied by the Arabs. As a consequence, the vague statements of the Korân were soon variously interpreted, and a host of sects gradually arose. Of these, four only are regarded as orthodox, leaving not less than seventy-two heretical, whose discordant tenets are stated in the work of Shahrestani (trans. by Cureton, London, 1842). The four orthodox sects arose in the 8th century, and are: the Hanbalites, who do not reject tradition, but subordinate it to reason; the Shâfiites, who entirely refuse the aids of reason and philosophy in their treatment of theology; the Kambalites and the Malechites, who allow speculation on points where there is no tradition. The collection of traditions known as the *Sunna* gives an account of the sayings and doings of Mohammed, and, though pedantic in its details, is in substance more valuable than the Korân. The interpretation of the Korân constitutes the principal part of education in theological jurisprudence. The most celebrated of the commentators are Zamakhshari, rationalistic, and Baidhawî, orthodox. Consult Tornauw, *Das Moslemische Recht* (1885).

Arabian philosophy, which was of Greek origin, held the same relation to the Korân as the Scholasticism of the middle ages did to the Christian Scriptures - that is, it was regarded as the servant of faith. The chief study of the Arabs was the writings of Aristotle, who became known in Spain, and subsequently in all Western Europe, through

translations from Arabic into Latin; though the Arabs themselves only knew the Greek philosopher in translations made during the time of the Abbasides. Especial attention was paid to logic and metaphysics. The most distinguished of their philosophical writers are: the honoured leader, Alkindi of Basra, who flourished about the beginning of the 9th century; Alfarābī, who wrote a work on First Principles in 954; Avicenna (died 1036), who combined the study of logic and metaphysics with that of medicine, and made considerable progress in chemistry, nosology, and medical botany; Alghazali (died in Bagdad, 1111); Abubekr-ibn-Tofail (died in Seville, 1190); and his pupil, Averroes, greatly esteemed as an expositor of Aristotle. For an account of these men and their systems, see *Sur les Écoles Philosophiques chez les Arabes*, by Schmückler (Paris, 1842); and Rénan's *Averroès et l'Averroïsme* (1850).

Many of these illustrious Arabian philosophers were also physicians. The science of medicine is essentially a creation of the Arabs, to whom the oldest sources of knowledge—that of the Indian physicians—had been early opened. Chemical pharmacy (see ALCHEMY) was created by the Arabs. Pharmacy and *materia medica* naturally led to botany and chemistry. For three centuries—from the 8th to the 11th—a rich scientific culture prevailed. Schools of philosophy and medicine sprang up at Jondisāhur, Bagdad, Ispahan, Firuzabad, Bokhara, Kufa, Basra, Alexandria, Cordova, &c. In all departments of medical science a great advance was made, except in anatomy (the Korān forbidding the dissection of human bodies). The most famous writers on medicine are Rāzi of Bagdad (died 922); Alkindi; Avicenna (980–1037), who wrote the *Canon of Medicine*, for a long time the only handbook on the subject; Abulkasem of Cordova (died 1107); and Averroes (1126–98), who wrote a complete system of medicine.

In mathematics, the Arabs made great advances by the introduction from India of the numerals and mode of notation now in use, of the sine instead of the chord in trigonometry (thanks to Albatāni), and of a more extended application of algebra. While alchemists, searching for the elixir of life and the philosopher's stone, were founding chemistry, astrologers were enriching astronomy, which was zealously studied in the famous schools and observatories of Bagdad and Cordova. Alhazān wrote upon optics. The *Almagest* or System of Astronomy by Ptolemy was translated into Arabic as early as 812. In the 10th century, Albatāni, the greatest of Arabian astronomers, a Sabaean by religion, and born in Haran (died 929), observed the advance of the line of the apsidēs in the earth's orbit. Abul-Hassan-ʿAlī wrote on astronomical instruments in the 13th century.

Besides these advances in the solid branches of knowledge, the genius of the Arabs continually flowered into poetry. Numerous poets sprang up in all lands where the children of the desert had carried their irresistible faith. Their verse, however, was not like the rude, simple minstrelsy of a purely patriarchal people; it gradually allied itself to the prevailing culture, and took, especially in the golden epoch of Arabian civilisation, a high artistic form. None have been more highly esteemed than Motanebbi (killed 965) and Abutemām (died 845), who compiled the old poems that compose the *Hamāsch*. Famous, too, are the satirist Abul Olā (died 1057), the Egyptian Busīri, whose *Bordah* is a eulogy of Mohammed, and two Syrians, El-Kūmī (died 896) and the profound Il-Fārīd (died 1235; his *Dirān* was published at Beyrout, 1874). Hamadāni (died 1007) introduced novels in rhyming prose like that of the Korān, and wrote four hundred of them

under the name of *Maqāmāt*. Harīri (died 1121) brought this form of literature to perfection. Azzeddin (died 1279) wrote an ingenious allegorical poem, 'The Birds and the Flowers.' Besides these, a singularly wild and fantastic prose literature made its appearance, in which the craving for the wonderful and gorgeous, so characteristic of the restless, adventurous Arabs, was richly gratified. Romances and legendary tales abounded. The most famous of these are: *The Arabian Nights' Entertainments* (q.v.), *The Exploits of Antor* (pub. Bulāq, 1869), *The Exploits of the Champions*, and *The Exploits of Bibārs*. The taste for proverbs, fables, and biography was extensively indulged. In fact, with the exception of the drama, condemned by the Prophet, there was no sort of literature that the Arabs did not attempt. The trouvères of Northern France, the troubadours of Provence, the inspirers of Italy, and the romancers of medieval Europe owed much to the Arabs, whose influence on modern literature still endures. The tales of fays, charms, sorceries, and the whole gorgeous machinery of enchantment, passed into the poetry of the West. During the middle ages of European history, several of the most popular and widely-spread books came from or through the Arabs; such as *The Seven Wise Masters*, and *The Fables of Bidpai* (q.v.), though the Arabians themselves borrowed largely from the Persian stories and the Greek fables. See Clouston's *Arabic Poetry for English Readers* (Glasg. 1881).

All this culture of the early ages of Mohammedanism presents a strong contrast to the ignorance which now prevails among the Arabs. The brutal fanaticism of the Turks nipped the blooming promise of the East; sank in stupid indolence, the peoples await in apathetic resignation their deliverance and return to higher modes of life. Literature furnishes now nothing worthy of notice. Learning spends itself principally in commentaries and scholia, in scholastic discussions on the subject-matter of dogmatics and jurisprudence, and in tedious grammatical disquisitions concerning the old Arabic speech, generally acute and subtle, but always unprofitable and unenlivening. The swift and mobile genius of the East has departed, and pedantic dullness has usurped its place. There are 'Dryasdnists' even in the desert. A few modern writers have attempted, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabagh of Syria; the Sheikh Refaa of Cairo; Nasif-Effendi of Beirūt, who wrote the critical observations in De Sacy's edition of Harīri (*Epistola Critica*, Leip. 1848); B. Bistāni in his cyclopaedia (Beirūt, 1875).

The Arabic also possesses a Christian and Jewish literature, which, however, is chiefly ecclesiastical. Its principal ornaments are Eutychius, Ebnakīn, and Abulfāraj. Translations of the Old Testament were made, not from the Hebrew, but from the Septuagint, or from Latin versions. In the middle ages, the Spanish Jews employed Arabic for their learned compositions; and several of the most important works of Moses Maimonides, for example, were originally written in that tongue. Consult on Arabian literature, D'Herbelot's *Bibliothèque Orientale*; Krenmer's *Kulturgeschichte des Orients* (1875–7); Zenker's *Bibliotheca Orientalis* (1846–61); and Ibn Ishāq's *Kitāb-al-Fihrist*, the oldest Arab cyclopaedia of literature, of about 1000 A.D., published by Flügel (2 vols. Leip. 1871–2).

The Arabic language, it has been remarked, is at once both *rich* and *poor*. It is necessarily destitute of innumerable words describing those ideas and objects which only civilisation can develop or produce; but, on the other hand, the rich and nimble fancy of the Arabians has multi-

plied, to an almost incredible extent, the synonyms of their desert-tongue, so that in some cases hundreds of expressions are found for the same thing. The Arabic belongs to the so-called Semitic family of languages, among which it is distinguished for its antiquity and soft flexible grace. Through the Korān, the dialect of an Ishmaelitic tribe, the Koreish, became the predominant language of literature and commerce throughout the whole extent of the Arabian dominions. The Himyaritic from Abyssinia, and closely akin to the ancient Ethiopic, is known as yet only by a few inscriptions, &c. Arab poems till 750 consisted mostly of from two to one hundred and twenty lines of one rhyme. Thereafter was developed an exact and complex prosody. Al-Jauhari, who died in 1009 A.D., drew up a dictionary of the pure Arabic speech, which he entitled *Al-Sihah* ('Purity'), and which is held in high estimation to this day. Mohammed-ben-Yakūb-al-Firuzabādi, who died in 1414, was the author of an Arabic Thesaurus, entitled *Al-Kāmil* ('The Ocean'), which is the best lexicon in the language, and has consequently been translated into Persian and Turkish. Jordsani has explained, in alphabetical order, the meaning of the technical terms used in Arabic art and science. His work was published by Flügel (Leip. 1845), under the title of *Definitions*. Meidani made a large collection of Arabic 'saws,' aphorisms, &c., which was published by Freytag (Bonn, 1838). Through the conquests of the Arabs in Sicily and Spain, their language became known in Europe; but notwithstanding the numerous traces of its influence in various European tongues, it became forgotten after the expulsion of the Moors from Spain. The first European scholars who earnestly took up the subject were the Dutch, in the 17th century; after them, the Germans, French, and English. The more learned theological students consider it a necessary part of their education. Maltese is an Arabic dialect, akin to the Mozarabic of the Spanish Moors. In Turkish plainly, and even in Malay, the traces of Arabic appear. In Persian every fourth, and in Hindustani every fifth word is Arabic. In recent times the purely negro population of the central and western Sudan have, in receiving Islam, made considerable progress in civilisation and the knowledge of Arabic. The Arabic language is never printed but in the ancient classical form, of which the Korān is regarded as the unapproachable standard. Classical Arabic is spoken in northern Central Arabia, differences increasing with distance. Elsewhere the language has lost, as Hebrew had lost before the oldest books of the Bible were written, the final vowels distinctive of case in nouns, and person in verbs. Egyptian or Syrian Arabic is less pure than the native, but more pure than the Arabic spoken from Tripoli to Morocco. Wright's *Arabic Grammar* (new edition) is one of the best extant; Lane's *Arabic-English Lexicon* is a standard work; and Badger's *English-Arabic Lexicon* (1881) is also excellent. The grammatical and lexicographical works of Caspari, Freytag, Fleischer, and De Sacy, are most important. See SEMITIC LANGUAGES.

Arabic Writing.—Like all Semitic writing, this proceeds from right to left. It is borrowed from the old Syriac, and was probably introduced into Arabia by Christian missionaries about the time of Mohammed. In its oldest form it is called Kufic, from the town of Kufa, on the Euphrates, where the transcription of the Korān was busily carried on. Its characters are rude and coarse, and it has particular symbols for only sixteen of the twenty-eight Arabic consonants. This writing, nevertheless, continued to be employed for 300 years, and for coins and inscriptions even later; but in the 10th

century it was displaced for common purposes by a current handwriting, the *Neskhī*, introduced by Ibn Mokla. This is the character still in use, more or less modified, by all nations that have adopted the Mohammedan religion. In it, the consonants which resemble each other are distinguished by points, and the vowels by strokes over and under the line; but in writing and printing, the vowels are commonly omitted.

The following passage, the translation of John iii. 16 as published by the British and Foreign Bible Society, will show the character (see also ALPHABET, p. 188). It may be thus transliterated: *Liannahu hakatha ahabb Allah l'aham hattha bathal ihwahu elwahid khal la yuhlik kull man ya'min bihi bal takun lahu chahyat elabadat.*

لأنه هكذا أحب الله العالم حتى بذل ابنه
الوحيد لكي لا يهلك كل من يؤمن به بل تكون
له الحياة الأبدية.

Arabian Nights' Entertainments (*Alf Laylah wa Laylah*, 'A Thousand Nights and a Night'), in Christian lands, the best known product of Arabian literature. The name and plan of this work are very ancient. Mas'udi in his famous history, *Golden Meadows*, written in 943, mentions the Persian Hezar Afsona, translated into Arabic with the name *A Thousand Nights and a Night*. Mohammed-ibn-Ishāq, in his work *Al-Fihrist*, written in 987, mentions the Persian work as well known to him, and as containing about two hundred tales divided into a thousand nights. He thus relates its origin. A Persian king used to marry a new bride every day, and put her to death next morning. One wife was Shahrazād (Scheherazade), who had understanding and discretion. As they sat together she began a tale, and late at night she broke it off at such an interesting point that the king next morning spared her life, and at night begged her to continue her tale. So she did a thousand nights. Meantime she bore him a child. Presenting the child to him, she told him of the craft she had used; and the king, whose love she had now gained, admired her policy and let her live. Mohammed adds that the book was written for the Princess Homai, daughter of Bahman Artaxerxes, and that it had been translated into Arabic with alterations, some new tales being substituted for old.

The much-befabled Princess Homai is half mythical, like the Babylonian Semiramis, an accredited doer of many things whose author is unknown. Mas'udi tells that her mother was a Jewess whom Bahman had married, and who delivered her people from bondage: in short, she was the Esther of Israelitish tradition. But Persian poets and Arabian historians do not make it clear whether the name Shahrazād belonged to the mother or the daughter. Tabari calls Esther the mother of Bahman Artaxerxes (Longimanns); this is implied in the biblical story, as Ahasuerus seems to be Hebrew for Xerxes.

The occasion of the book written for the Princess Homai resembles the story told in the Hebrew Bible about Esther, her mother or grandmother, by some Persian Jew two or three centuries B.C. The likeness is closer between the biblical story and that of Shahrazād as it appears in the Arabian Nights, the surviving representative of the Persian *Thousand and One Nights*. In both, the Persian

king is offended with his queen; from the Persian book we cannot tell why; in the Hebrew, because she has insulted him at a banquet before his princes and lords; in the Arabian, for a fouler reason. In all three, thereafter, the king has a new wife daily. The Persian and the Arabic consign her next morning to death; the Hebrew merely to the seclusion of the harem. All three tell that the king at length honoured as queen the one that gained his lasting love; the Arabic makes her the grand-vizier's daughter; the Hebrew, the vizier's foster-daughter. The Persian ascribes to her her people's deliverance from bondage; the Hebrew, their salvation from massacre; the Arabic originates her hardy resolution to marry the blood-thirsty king in her zeal to save the daughters of her people. In all three the king is charmed at night with recitals from the past. In the Persian story she is aided by the king's housekeeper, in the Arabian by her own sister, in the Hebrew by the king's chamberlain.

A quotation by Makrizi from Ibn Saïd of about 1250, mentions the *Thousand and One Nights* as a romantic work. Meantime the work seems to have, in the course of centuries, had the experience of a celebrated pair of hose which lost their identity by universal patching, and to have been edited into its present form about 1450 in Egypt, and most probably in Cairo. How much of the Princess Homai's book remains in it we cannot tell, nor where to look for this remainder. The Persian origin of some of the tales is evident; equally evident the Indian origin of others, notwithstanding the location in Bagdad, and the presence of the Calif Haroun Al-Raschid. But in a great part of the work both form and matter appear to be Arabian. The foundation of many tales in history or legend or older tales limits their age. The story of the city whose inhabitants are turned into fishes, the Christians into blue, the Magians into red, the Jews into yellow, the Moslems into white, cannot well be older than the year 1301, when the sultan of Egypt, to distinguish true believers from infidels, ordered Christians to wear blue turbans, and Jews yellow, while white turbans were reserved for Moslems alone. The story told by the purveyor of the sultan of Cashgar is taken, and considerably spoiled in the taking, from the Chronicle of Ibn-Al-Jauzi, who died in 1200. It is the story of Qamar, slave of the princess mother of Al Moqtadir, who was calif from 910 to 932. Others are traced by Mr Lane.

The *Thousand and One Nights* has never been patronised or protected by the literary classes of the East. The puritanical spirit of high Mohammedan literature demands an apology from any merely entertaining author for not better employing his time. The *Thousand and One Nights* accordingly bears the penalty of being neither religious nor scientific. Its style is mean; it has been much handed about in fragments among the comparatively uneducated; told by professional story-tellers so as to suit the rough audiences of Eastern towns; and copied from such men's dictation, individual taste or fancy filling many a blank.

Various editions differ considerably in the ordering and order of the stories. The best are the not well-printed Bulak edition, the very similar but well-printed Calcutta edition of 1839, and the Breslau edition. No MS. appears to be older than 1548, the date of that used by Antoine Galland. His French translation, published in Paris, 1704-8, in 12 vols., was long supposed to be the fruit of his own imagination. It much misrepresents his original, and the Eastern life. Rendered into English, it is the most popular form of the *Thousand and One Nights* in Britain. He inserted into it ten tales of unknown origin; but in 1887

Burton found the Arabic text of two of these (including Aladdin) in a Parisian library. In 1840 E. W. Lane, prepared by several years spent in Cairo entirely among Arabs in the Arabian manner, published his scholarly translation, in which he has sacrificed the coarseness of the original and much of its wearisome length. His notes are admirable, and often as delightful as the text. Payne's translation, complete but not very accurate, was published for subscribers in 9 vols. 1882-4. Sir Richard Burton's varied learning and rare mastery of English and Arabic make his translation, printed for subscribers in 10 vols. (at 'Benares,' 1885-87), a vigorous and uncompromisingly accurate representation of the original. Five supplementary volumes were added subsequently. Lady Burton's expurgated edition of her husband's work is in course of publication (1887). See M. J. De Goeje on the whole subject in *De Gids*, September 1886.

Arabian Numerals or CIPHERS—the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Properly, they should be styled Hindi or Indian Numerals, for the Arabs borrowed them, along with the decimal system of notation, from the Hindus, probably in 773 A.D. Gerbert (afterwards Sylvester II.) seems to have learned the use of them from the Moors in Spain about the year 970. Yet their employment was long in making its way, and was not general before the invention of printing. Accounts continued to be kept in Roman numerals up to the 16th century. See NUMERALS, ALPHABET.

Arabian Sea, the *Mare Erythraum* ('Red Sea') of the ancients (though these terms appear to have been applied with considerable vagueness), is that part of the Indian Ocean which lies between India on the east and Arabia on the west. Its most natural and convenient limit on the south is a line drawn from Cape Comorin to Cape Guardafui. Its two great arms are the Red Sea proper and the Persian Gulf.

Arabin is the essential principle of gum-arabic, and is obtained pure by adding alcohol to a solution of gum-arabic in water, when the arabin is precipitated in white flocculi. See GUM.

Ara'bi Pasha, leader of the military and insurrectionary party in Egypt in 1882. See EGYPT.

Aracan. See ARAKAN.

Aracari, a genus of birds closely allied to the Toucans. See TOUCAN.

Arac'ee. See ARUM.

Arachis. See GROUND-PEAN.

Arach'nida (Gr. *arachnē*, 'a spider'), a subclass of Tracheate Arthropoda (q.v. under ARTICULATA), including scorpions, spiders, mites, &c., and first separated by Lamarck from the Insecta of Linnaeus. The body is usually divided into cephalo-thorax and abdomen, the latter destitute of appendages, the former possessing six pairs, of which the posterior four pairs are walking limbs, thus furnishing a ready means of distinction from insects, which have three pairs only. The two anterior pairs, known as chelicere and pedipal, are of various forms, the former usually chelate or sub-chelate; the latter chelate, ambulatory, or antenniform. Respiration is effected by means of tracheal tubes, or by pouches—the so-called respiratory sacs.

Those arachnida with segmented abdomen are termed Arthrogastra, and include five families, of which Scorpio, Thelyphonus, Chelifer, Galeodes, and Phalangium are types. These show a distinct gradation to true spiders or Araneina, which are easily recognised by their unsegmented abdomen, usually furnished with spinning glands, opening by four to six posterior papillae, and by their sub-

chelate chelicerae and ambulatory pedipalpi. The mites and ticks (*Acarina*) have the unsegmented abdomen continuous with the thorax, and the chelicerae and pedipalpi are modified into a sucking or piercing apparatus. The Lingnatulida (*Pentastomum*), the Tardigrada, and the Pycnogonida, have usually been reckoned as highly modified arachnides, somewhat akin to the Acarina; the most recent anatomists, however, tend to remove them from the arachnida altogether. On the other hand, it has lately been clearly shown that the Sibirian Eurypterida, and the ancient, but still persistent Limulus (see KING-CRAB), must be reckoned rather as arachnides than as crustaceans, and thus the two great divisions of the Arthropoda, the Tracheata and the Branchiata, are shown to have diverged in paleozoic times. See ACARINA, MITE, SCORPION, SPIDER, and TICK; also Huxley's *Anatomy of Invertebrated Animals*, Balfour's *Comparative Embryology*, and Cambridge's monograph in *Encyclopædia Britannica* (9th ed.).

Arachnoid Membrane, one of the three coverings of the brain and spinal cord, is situated between the dura-mater and the pia-mater. It is non-vascular, transparent, and remarkably thin. Its outer surface, next the dura-mater, is free, smooth, and glistening; its inner surface is connected to the pia-mater by numerous delicate threads, which traverse the space (sub-arachnoid) between the two membranes. Some anatomists regard the space between arachnoid membrane and dura-mater (sub-dural) as a serous cavity bounded by a serous membrane, of which the arachnoid membrane is its visceral layer, and the inner free shining surface of the dura-mater its parietal layer. The sub-arachnoid space contains a fluid named cerebro-spinal, which in health varies in amount from two drachms to two ounces. See BRAIN, CEREBRO-SPINAL FLUID, PIA-MATER.

Arad, capital of a district in Eastern Hungary, is situated on the right bank of the Maros, an affluent of the Theiss, and has a population (1880) of 35,556, including many Jews. It is an important railway centre, and is 95 miles SE. of Buda-Pesth, and 74 miles E. of Szegedin by rail. It carries on a large trade in corn, spirits, wine, and tobacco, and is one of the greatest cattle markets in Hungary. During the 17th century it was often captured, and at last destroyed by the Turks. During the revolutionary war of 1849 it was occupied for a time by the Austrians, who capitulated to the Hungarians in July. In August, Arad was surrendered to the Russians by Görgei; many of the prisoners were massacred; and in October, thirteen Hungarian officers were executed here by order of the infamous Haynau.—NEW ARAD, on the other side of the river, has 5000 inhabitants, including many Germans. The county or province of Arad has an area of 2490 sq. m., with a pop. of (1881) 303,964. It borders on Transylvania, and produces much excellent wine; the inhabitants are chiefly Roumanian in race.

Aræom'eter. See AREOMETER.

Araf, the purgatory of Islam, the place between Paradise and hell. Its position has not been defined with the usual exactness of Mohammed, but it is undoubtedly a place of purification by fire.

Ar'afat, MOUNT, *Orphat* or *Jebel-er-rahme* ('mountain of mercy'), is a granite hill about 15 miles SE. of Mecca, visited by the faithful, and believed to be the spot where Adam, conducted by the angel Gabriel, met again his wife Eve, after a punitive separation of 200 years, on account of their disobedience in Paradise. It is not above 260 feet high, but its circuit is a mile and a half.

Arago, FRANÇOIS JEAN DOMINIQUE, a celebrated French astronomer and physicist, was born

February 26, 1786, at Estagel near Perpignan, in the department of Pyrénées Orientales. At the early age of seventeen, he entered the Polytechnic School at Paris, and in 1804 became secretary to the Observatory. Two years afterwards he was engaged, with Biot, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. Arago and Biot had to extend it from Barcelona to the Balearic Isles. The two savans established themselves on the summit of Mount Galatza, one of the highest of the Eastern Pyrenees, and here they lived for many months. War broke out betwixt France and Spain, and Arago was held to be a spy; his signals, supposed to be meant to guide the French invading army, were interrupted; and with great difficulty he succeeded in reaching Majorca. Having gone to Algiers, he was captured, on his way back to France, by a Spanish cruiser; and it was not till June 1809 that he finally arrived at Marseilles. As a reward for his sufferings in the cause of science, he was elected a member of the Academy of Sciences, though only twenty-three years of age, and was appointed professor of Analytical Geometry in the Polytechnic School.

His laurels were, however, won mainly in the fields of astronomy, magnetism, and optics. In 1812 he commenced his extraordinary course of lectures on astronomy and cognate subjects, which fascinated all Paris. In 1816, along with Gay Lussac, he established the *Annales de Chimie et de Physique*, and confirmed the truth of the undulatory theory of light. In 1818 he published his *Résumé d'Observations Géodésiques, Astronomiques, et Physiques*, and, with Biot, made geodetic observations on the coasts of England and Scotland. In 1820 he made several important discoveries in electro-magnetism especially the phenomenon of *rotatory magnetism*. He may be said to have proved the relation between the aurora borealis and magnetic variations. He greatly promoted the acceptance of the undulatory theory of light, and made important advances in the doctrine of the polarisation of light. Other minor achievements were made in the department of photometric measurements of the brightness of the stars, the elastic force of steam and other gases. In 1830 he became chief director of the observatory, and received the post of Perpetual Secretary of the Academy. It was while holding the latter office that he wrote his famous *logs* of deceased members. He took a prominent part in the July revolution (1830). Elected by Perpignan as member of the Chamber of Deputies, he occupied a position on the extreme left. In the revolution of 1848, he was chosen a member of the provisional government, and in this position he resisted the proposed measures of the Socialist party. Arago opposed Louis Napoleon, and refused to take the oath of allegiance after the *coup d'état* of 1852. He died 3d October 1853, and was honoured with a public funeral. His works were edited by Barral (17 vols. 1854-62), including the *Astronomie Populaire* and the *Notices Biographiques*. See Andiganne's *Arago, son Génie et son Influence* (2d ed. 1869).

JACQUES ÉTIENNE VICTOR ARAGO, brother of the great savant, was born 10th March 1790. In 1817 he accompanied an expedition round the world. Afterwards, we find him first at Bordeaux, and then at Toulouse, writing vaudevilles, besides publishing poems and romances. From 1835 to 1837 he managed the theatre at Rouen. His *Promenade autour du Monde* (1822), and *Souvenir d'un Arc-en-ciel* (1838), are well known. In 1849, though blind, he formed a company of speculators, and departed for California, to search for gold.

On his return he published *Une Vie Agitée* (1853). He died in Brazil in January 1855.—ETIENNE, another brother of the astronomer, was born 9th February 1802, and made himself well known as a popular author. He held an appointment under the provisional government of 1848, and was afterwards exiled. In 1859 he returned to France. In 1878 he became archivist in the *École des Beaux Arts*.—EMANUEL, son of the astronomer, born 1812, became known as a zealous republican in 1848, and was after 1852 active as a barrister. In 1870 he became a member of the committee of national defence, and afterwards held appointments under the government.

Aragon, once a kingdom, now divided into the three provinces of Saragossa, Huesca, and Ternel, in the N.E. of Spain. Greatest length from north to south, 190 miles; breadth, 130. Area, 17,980 sq. m. Pop. (1884) 925,920. It is bounded on the north by the Pyrenees, and borders on Navarre, the Castiles, Valencia, and Catalonia. The Ebro flows through Aragon in a south-easterly direction, receiving numerous tributaries both from the lofty regions of the Pyrenees and from the Sierras in the south. The province is naturally divided into the level country along the Ebro, and the northern mountainous district of Upper Aragon. The central plain is sterile, poorly supplied with water, and intersected by deep ravines. The valleys of Upper Aragon are at once the most beautiful and fertile of all the Pyrenean valleys. The Spanish Pyrenees, which attain a height of over 11,000 feet, are rich in grand scenery, and afford good sport for the angler and sportsman. The slopes of the hills are clothed with forests of oak, beech, and pine. The minerals of the province are copper, lead, iron, salt, alum, saltpetre, coal, and amber. The silk-worm industry has been introduced. Aragon is peopled by a brave, active, enduring, but obstinate race, high-spirited and patriotic, making good soldiers or audacious robbers. It early became a Roman province; and, on the fall of the empire, passed into the hands of the West Goths, but was conquered by the Moors in the beginning of the 8th century. The rulers of Aragon, after it had been recovered from the Moors and united with Catalonia (1137), became powerful; obtained possession of the Balearic Isles in 1213, of Sicily in 1282, of Sardinia in 1326, and of Naples in 1440. By the marriage of Ferdinand of Aragon with Isabella, heiress of Castile, in 1469, the two states of Aragon and Castile were united, and formed the foundation of the great Spanish monarchy. After Ferdinand's death in 1516, the union of the states was made permanent. The constitutional history of Aragon is peculiarly interesting for the stout defence of popular rights maintained by its cortes; even after the union with Castile, the old privileges were maintained. In the war with the French, 1808-9, Saragossa, the capital of Aragon, was remarkable for its heroic defence under Palafox. The chief towns are Saragossa, Calatayud, Huesca, and Ternel.

Arango-na, a town of Sicily, 6 miles N.N.E. of Girgenti by rail, with the old castle of the princes of Aragona. Near it are important sulphur-springs. Pop. (1881) 9571.

Aragonite, a mineral essentially consisting of carbonate of lime, and so agreeing in chemical composition with Calcareous Spar (q.v.) but differing from it in the form of its crystals, of which the primary form is a rhombic prism with angles of $116^{\circ} 16'$ and $63^{\circ} 44'$, the secondary forms being generally prismatic and pyramidal. The effect of heat on them shows another difference, aragonite being reduced to powder by a heat in which calcareous spar will remain unchanged. Aragonite

appears to be the product of a crystallisation taking place at a higher temperature than that in which calcareous spar is produced; and accordingly it is frequent in volcanic districts and in the neighbourhood of hot springs, as at Carlsbad. It is frequently found filling cavities (see AMYGDALOID), and lining cracks, joints, and other natural fissures in such igneous rocks as basalt and its varieties, porphyrite, &c. as in Scotland. It derives its name from the province of Aragon in Spain. It sometimes occurs in stalactitic form. Its crystals are sometimes prisms shortened into tables, sometimes they are lengthened into needles. Twin crystals (*maclas*) are very common. *Satin spar* is a variety of it, in which the crystals are of a fine fibrous silky appearance, and combined together into a compact mass. *Flos ferri* (i.e. flower of iron) is a name given to a coralloidal variety which sometimes occurs in iron mines.

Araguay, a large river of Brazil, rising in the Sierra Seada, and flowing 1000 miles northward, till, at San Jono, it joins the Tocantins, which again, after a northerly course of 300 miles more, mingles its estuary with that of the Amazon round the Isle of Marajo.

Arakan (*Arakán*; also spelt *Aracan* and *Arracan*), long the most northerly division of British Burmah, is a narrow strip of territory on the Bay of Bengal, between Pegu and Chittagong, in Lower Bengal. Its length is about 400 miles, while its breadth varies from 90 miles in the north to about 15. The area is 14,526 sq. m. A range of mountains, nearly parallel with the line of coast, the highest point 7000 feet above the sea-level, separates Arakan from Pegu and Upper Burmah. The soil of the northern portion of Arakan is alluvial; but the country is hilly, difficult of access, and covered with forest. The province is divided into four districts—Akyah, Sandoway, Kyauk-Pyon, and North Arakan, or the Hill Tracts. At its annexation in 1826, the population was only about 100,000; in 1831, it was 173,000; in 1839, it had increased to 248,000; in 1872, 483,363; and at the census of 1881, 587,518. With these results the state of trade fully corresponds. Rice is the chief article of exportation; the others are cotton, tobacco, sugar, hemp, indigo, betel-nuts, and timber, especially teak. The imports consist mainly of British manufactures.

The native princes of Arakan, whose history is traced back to the 8th century, once ruled over a much wider area. The old capital, Arakan, now called Mro-hong ('old town'), is situated 50 miles from the sea, in a very unhealthy district. It was the capital of a kingdom for 350 years, and its massive ruins of forts and walls still point to its former greatness. But its population now is hardly more than 2000 souls. The modern capital of the province is Akyah (q.v.). The Arakanese belong to the Burman stock, and are Buddhists, though there are a few immigrant Mohammedans.

Aral Lake, separated by the plateau of Ust-Urt from the Caspian Sea, is the largest lake in the steppes of Asia. It lies wholly within the limits of Russian Central Asia, embracing an area of about 24,000 sq. m. It is fed by the Sir-Darya (the ancient Jaxartes) on the N.E. side, and the Amu-Darya (or ancient Oxus) on the S.E. It has no outlet, and is generally shallow, its only deep water being on the west coast, where it reaches a depth of 225 feet; but it shoals gradually eastward to a mere marshy swamp. Its level is 117 feet above that of the Caspian, which is 84 feet below the surface of the Black Sea. Like other lakes which are drained only by evaporation, it is brackish. Fish, including sturgeon, carp, and

herring, are abundant. The lake is dotted with multitudes of islands and islets. Owing to the shallowness of its waters, and its frequent exposure to fierce and sudden storms from the NE., navigation is difficult; and a flotilla of flat-bottomed gunboats, built for this sea by the Russians, and which took part in the operations against Khiva in 1873, alone patrols its surface. The history of the Sea of Aral is very remarkable. Sir Henry Rawlinson and Colonel Yule collected references made to it in Greek, Latin, Arabic, and Persian writers, and established the fact that the area it now occupies has been dry land twice within historical times—the Jaxartes and the Oxus then running south of the Sea of Aral to the Caspian. This was the case during the Greco-Roman period, and again during the 13th and 14th centuries after Christ. The Russian government, which pushed its frontier as far east as the Aral in 1848, has abandoned the idea of the diversion of the Oxus to the Caspian Sea, and has proposed to unite the two lakes by means of the steppe river Chogan, round the northern edge of the Ust-Urt plateau. See the article ASIA; *Proceedings of Royal Geographical Society*; and *The Shores of Lake Aral*, by Major Wood (1876). Also, for the formation of the lake, see Roessler's *Aralschfrage* (Vien. 1873).

Aralia, a genus of plants, the type of the Araliaceæ, which are a sub-order of Umbelliferae—developed in inflorescence, which is often racemose-umbellate, and in fruit, which has usually more than two carpels, and is often succulent—witness the berries of the common ivy. The order contains about 160 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. Poisonous qualities are not developed as in the Umbelliferae. The herbage of many species affords good food for cattle, and some are used for human food. The genus *Aralia* contains a considerable number of species—trees, shrubs, and herbaceous plants. *A. nudicaulis* is sometimes substituted in the United States for sarsaparilla; and *A. racemosa*, *A. spinosa*, and *A. hispida*, all natives of North America, produce an aromatic gum resin. *A. spinosa* is a diaphoretic stimulant. The berries, infused in wine or spirits, are employed in America as a cure for rheumatism. It is sometimes called Toothache-tree; it also bears the name of Angelica-tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 feet, with a single stem, spreading head, doubly and trebly pinnate leaves and ovate leaflets, and is very ornamental in a lawn. *A. polaris*, found in the southern island of New Zealand, described by Hooker as a very magnificent plant, is a herbaceous perennial, 4 to 5 feet high, with large orbicular masses of green foliage and waxy flowers, presenting a very striking appearance. *A. edulis*, now called *Dimorphanthus edulis*, is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavour, are used by the Japanese as carrots or parsnips are in Europe. Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice-paper is cut from cylinders of the pith of an *Aralia*. Ginseng (q.v.), the root of a species of *Panax*, is one of the most important products of the order Araliaceæ. But it is upon their remarkable value as decorative plants that the interest and cultivation of the group increasingly depends. The only representative of this order in the British flora is the Ivy (q.v.).

Aram, EUGENE, was born in 1704 at Ramsgill, in Yorkshire. Though but the son of a poor gardener he contrived to acquire considerable learning, married early, and became a schoolmaster, first in Netherdale, and afterwards at Knaresborough, where he became intimate with one Daniel Clarke, a shoemaker. The sudden disappearance of the latter in 1745, at a time when he happened to be in temporary possession of a quantity of valuable goods, threw suspicion upon Aram, not as Clarke's murderer, but as his confederate in swindling the public. His garden was searched, and in it was found a portion of the missing property. Aram was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough, acted as a schoolmaster at various places in England, acquiring, in spite of his nomadic mode of life, a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish. He had already amassed considerable materials for a Comparative Lexicon of the English, Latin, Greek, Hebrew, and Celtic languages. His secret was betrayed by a confederate, who excited suspicion by the loudness of his protestations that a certain skeleton that had been found near Knaresborough was not that of Clarke. The accomplice was at last driven to confess where the murdered man had been buried; the bones were exhumed and identified, and Aram was suddenly dragged from his ushership at Lynn Academy in Norfolk, and thrown into prison on a charge of murder. He was tried at York, 3d August 1759, and sentenced to be hanged within three days. At the trial he conducted his own defence, attacking with great acumen, plausibility, and curious erudition, the doctrine of circumstantial evidence. After his condemnation, he confessed his guilt, wrote a defence of suicide, but failed in an attempt to illustrate his essay. A factitious interest has been attached to Aram's miserable story from Lord Lytton's overpraised romance, *Eugene Aram*, and Hood's powerful ballad, 'The Dream of Eugene Aram.'

Aramaic (from the Hebrew word *Aram*, signifying the 'highland,' in opposition to the lowland of Canaan) includes the whole of the country situated to the NE. of Palestine. It embraced the countries known to the Greeks by the various names of Syria, Babylonia, and Mesopotamia. The *Aramaic language*, a branch of the Semitic, was common to the whole country, and was divided into two principal dialects—the West Aramaic or Syriac, and the East Aramaic, or, as it is improperly termed, the Chaldee. The former was that spoken almost universally in Palestine in the time of Christ. After the Babylonian captivity, the pure Hebrew, in which the whole of the Old Testament, with the exception of a few chapters in Daniel and Ezra, had been written, gradually gave place to the Aramaic. It was the common tongue of Palestine in the time of Jesus, and his quotations from the Old Testament are from an Aramaic version rather than from the original Hebrew; as, for instance, the beginning of the 22d Psalm, which he repeated on the Cross; while all the Semitic words that occur in the New Testament, as well as in Josephus, are also Aramaic, as *Mammon*, *Taka*, *Eli, Eli, &c.*; *Talitha kumi*, *Abba*, &c. The Talmud, especially the Babylonian, has a large admixture of Aramaic elements, while the Targums are entirely composed in this idiom. The Aramaic dialect is, in general, the harshest, poorest, and least elaborate of all the Semitic languages, and has now almost entirely died out and given place to the Arabic and Persian. In respect of development it stands midway between classical Hebrew and modern Arabic, having lost the severe simplicity of the one without gaining the flexible and cosmopolitan variety of the other. See SEMITIC LANGUAGES and TARGUM.

Aran, *SOUTH ISLES OF, Ireland.* These are three small islands lying NE. and SW. across the entrance to Galway Bay. Total area, 11,287 acres. The principal or west island, Inishmore or Aranmore, is 7 miles long and 2 broad; Inishmaan, or 'Middle Isle,' comes next; and then Inishere to the SE. The islands consist of carboniferous limestone, and rise to the height of from 200 to 354 feet on the west side, ending in cliffs facing the Atlantic. Most of the land is rudely cultivated. Inishmore is still known as *Aran-na-naomh*, or 'Aran of the Saints,' and many pilgrims still visit the old shrines and remains of churches scattered through the islands, as also the little beehive stone huts of the monks of the 6th and 7th centuries. There are several circular cyclopean fortresses of unhewn uncemented stones, of which the largest is *Dun Aengus*, on a cliff in Inishmore. Pop. (1881) 3163, of whom two-thirds inhabit Inishmore.

Aranda, PEDRO DE BOLEA, COUNT OF, born in 1718 of a distinguished Aragonese family, at first embraced a military career, but was appointed ambassador to the court of Poland (1759), governor of Valencia (1763), and president of the Council of Castile (1766). Aranda not only soon restored order in the capital, but limited the power of the Inquisition, procured the expulsion of the Jesuits from Spain, and suppressed the banditti of the Sierra Morena. In 1773 he was removed from his high position through the influence of the clergy, and sent as ambassador to France. Recalled in 1792, he had soon to retire to his own estates, where he died in 1799.

Aranea and Arancidae. See SPIDER.

Aranjuez (probably the Latin *Ara Joris*), a town of Spain, on the left bank of the Tagus, 30 miles SSE. of Madrid by rail, in a beautifully wooded valley. The town is regularly built, with broad streets intersecting each other at right angles. The palace was long a favourite spring-resort of the royal family, and was altered and added to by successive sovereigns from Charles V. downwards. The famous gardens were laid out by Philip II.; their most splendid ornament are the great elm-trees brought from England by Philip II., which radiate from a central plot in twelve avenues. At Aranjuez was concluded a treaty between France and Spain in 1772, and it was also the scene of the abdication of Charles IV. in 1808. When the court was here, the pop. used to reach 20,000; now it is only about 8150.

Arany, JÁNOS, next to Petöfi the most distinguished of modern Hungarian poets, was the son of a poor peasant, and was born at Nagy-Szalonta, 2d March 1817. In 1832 he entered the college at Debreczin, but in 1836 joined for a time a company of strolling players. Settled at Szalonta, he worked as a teacher and as a notary. When the Kiskalnds Society offered a prize for the best humorous poem, his *Lost Constitution* obtained the prize. In 1847 he forwarded to the same society his *Toldi*, a national trilogy, which made the poet a popular favourite. In 1848 appeared his *Conquest of Munkacs*, which, however, was not so successful. He took a slight part in the revolution, but after the war was allowed to turn to his country. He was afterwards professor of Hungarian literature, director of the Kiskalnds Society, editor of a journal, and secretary of the Hungarian Academy (1865-70). Later works are: *Katalin*, a continuation of *Toldi*, two volumes of lyrics, *Buda Halála*, and a humorous poem recounting his early adventures (1874). Part of *Buda* has been translated into English. He died 22d October 1882.—His son LÁZSLÓ (born 24th March 1844) is also noted as a poet and translator of Shakespeare.

Arapaima, a genus of tropical fishes, including the largest known fresh-water forms. They are found in the rivers of South America, and are sometimes taken in the Rio Negro, 15 feet in length, and 4 cwt. in weight. They are shot with arrows or harpooned, and are highly esteemed as food; salted, they are conveyed in large quantities to Para. The genus *Arapaima* belongs to the family Osteoglossidae, allied to the Clupeidae or herring, and is remarkable for the mosaic work of strong bony scales with which the body is covered. The head is also protected by bony armature. Osteoglossum and Heterotis are closely related genera, found in various parts of the tropics.

Ararat (Armenian *Airarat*), a general old name for the district through which the Aras flows, and never the name by which the Mount of Ararat has been known to the people around it. Associated, however, as the mountains of this district are in Genesis, viii. 4, with the landing-place of the ark after the flood, the name has been, naturally enough, appropriated to the highest peak, which in Armenian is called Massis or Massis Ljan; in Tartar and Turkish, Aghri-Dagh, or curved mountain; and in Persian, Koh-i-Nuh, or Noah's mountain. The Chaldee legend, on the other hand, fixed the spot of Noah's landing in Gordyene, NE. of Nineveh and Mosul. The twin mountains of Ararat form an elliptical mass, 25 miles long from SE. to NW., by half that breadth, rising on the N. and E. out of the alluvial plain of the Aras, 2500 to 2800 feet high. The mass stands quite isolated on all sides but the NW., where a column 7000 feet high connects it with a long ridge of volcanic mountains extending westwards. From confluent bases of common level, 8800 feet high, the two peaks, both of entirely igneous formation, shoot upwards, Great Ararat to 16,969 feet, Little Ararat to 12,840 feet above the sea-level; the two summits 7 miles apart. From their isolation and bareness, the two peaks are very impressive. Little Ararat as an elegant cone of steep, smooth, regular sides; Great Ararat as a huge, broad-shouldered dome, supported by strong buttresses. The limit of perpetual snow rises in Ararat to nearly 14,000 feet. On the NE. side of Great Ararat is a remarkable chasm, 9000 feet deep, surrounded by monstrous precipices. There is a similar, but smaller, chasm on the SW. side. Ararat is singularly bare; the only wood of any extent, on the skirts of Little Ararat, at 7500 feet high, consisting of low birches. Ararat is perfectly dry throughout. Yet the mid-zone, from 5000 to 12,000 feet, is covered with good pasture, over which the Kurds wander in summer with their flocks. Below this mid-zone, Ararat has a steppe vegetation of dwarf prickly shrubs, and is unploughed and uninhabited. The top, at least during summer and autumn, is perfectly clear throughout the night, and till sometime after dawn. From 3 or 4 A.M., however, till sunset, clouds hang around Ararat for 3000 feet from the top. The view from the summit of Ararat, which towers over his neighbours much more than do Mont Blanc or Elburz, is singularly grand: there is the Caucasus, 280 miles away in the north; the dim plain of Erivan at the bottom; the extreme ranges of Taurus in the west; and a wilderness of bare reddish-brown mountains to the south and south-west. In 1828 the Czar Nicholas annexed the territory around Erivan; and Little Ararat is now the meeting points of the Russian, Turkish, and Persian empires. On the 20th of June 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, a ravine was closed, a convent and chapel disappeared, and the village of Arguri, and the gardens which

surrounded it, were buried under rocks, earth, and ice. Tournefort made a partial ascent of the mountain in 1700; since then, ascents have been made in 1829 by Professor Parrot of Dorpat; in 1850 by Colonel Chodzko, and a large party of Russians engaged in the Transcaucasian triangulation; in 1856 by Major Robert Stuart; in 1870 by Dr G. Radde and Dr G. Sievers; and in 1876 by Professor Bryce. See the article 'Reisen im Armenischen Hochland' (*Petermann's Mittheilungen* for 1871); also *Transcaucasia and Ararat*, by Professor Bryce (2d ed. 1878).

Aras' (the ancient *Araxes*), the chief river of Armenia, formed by the junction of the Bingol-Su and the Kaleh-Su, flowing E., S.E., and N.E., and uniting its waters with those of the Kur (ancient *Cyrus*) after a course of about 500 miles. It joins the Kur, which descends from the Caucasus through Georgia, about 75 miles from its mouth. Their united waters turn suddenly to the south, and fall by three mouths into the Gulf of Kizilgatch, in the Caspian Sea.

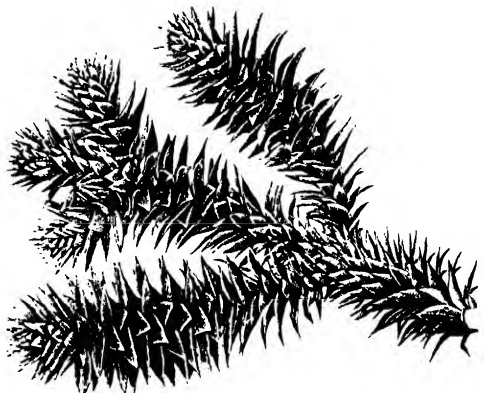
Aratus OF SICYON, a distinguished Greek statesman, was born about 271 B.C. He liberated Sicyon from its tyrant, Nicoles, in 251, and united it with the Achaian League, of which he was appointed general in 245. Under him the league grew in influence. His great object was to unite the Greek states, and form out of them an independent nation; but this was thwarted by their mutual jealousies and wars. The league ultimately fell under the power of Macedonia. Aratus was a brave general, a skilful tactician, and a disinterested patriot. According to Plutarch, he was poisoned in 213 by command of Philip III. of Macedon.

Aratus OF SOLI (or Pompeiopolis, in Cilicia) a physician and poet of noble birth, a contemporary of Callimachus and Theocritus, lived mostly during the latter part of his life at the court of Antigonos Gonatas of Macedonia, at whose instance he wrote, about 270 B.C., his astronomical poem, *Phænomena*. This was founded on the astronomical system of Eudoxos of Cnidos, and consisted of 732 verses. He appended to it another poem, *Dioscoria*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, but they lack originality and elevation. They were translated into Latin by Cicero, Cesar Germanicus, and Festus Avienus (q.v.). Aratus was a native of the same province as St Paul, who quotes from him in his speech on Mars' Hill: 'For as certain of your own poets have said, We also are his offspring.' The best editions are by Buttman (1826), Bekker (1828), and Köchly (1851); and there is a translation of the *Phænomena* into English verse by Robert Brown (1885).

Araucania, the country of the Araucos or Araucanian Indians, in the south of Chili. The Chilian province of Arauco, lying between the Andes and the Pacific Ocean, and bounded on the north by Concepcion, on the south by Valdivia, was formed in 1875, with an area of 8100 sq. m., and a pop. (1885) of 93,565. A large part of the territory in Arauco and the more southerly province of Valdivia, is occupied by Indians, who have of late mostly submitted to Chilian authority. The Araucanians are interesting as furnishing the only example of Indian self-government in the presence of the European races. They are a fierce and warlike people, and have a kind of military aristocratic constitution. Formerly the government rested in the hands of four chiefs (*Toquis*), each nominated by one of the four divisions of the people, and one of whom was elected 'great Toqui.' They have no formal laws, but custom and tradition have all the force of these. They do not

now number more than 50,000. Their country is divided from north to south into four parallel regions, with varying soil and climate. These are the coast region, the plain region, the region of the Lower Andes, and the region of the Higher Andes. Araucania has the proud distinction of being the only portion of the New World that has never received the European yoke. From the days of Pizarro and Almagro downwards, it has uniformly vindicated its freedom - its wars of independence having lasted, with intervals of precarious truce, from 1537 to 1773. In 1861 a French adventurer, Tonneins by name, ingratiating himself with the Indians, was elected king of Araucania as Orélie Antoine I. He was soon at war with Chili, and was captured and allowed to go to France. Returning to Araucania, he kept up a struggle with the Chilians in 1869-70, but repaired once more to France in 1871, where he posed for a time as a dispossessed king, and died in 1878. See his *L'Araucanie* (Bord. 1878); Smith's *Araucanians* (New York, 1855); and Medina's *Los Aborígenes de Chile* (Santiago, 1882).

Araucaria, an evergreen genus of Coniferae, consisting of lofty trees, natives of South America and Australasia. *A. imbricata*, sometimes called the CHILI PINE, or more popularly, from the sharp-pointed leaves, the Monkey-puzzle, is a native of



Branch of *Araucaria imbricata*.

the Andes of Chili, forming forests on their western declivities, where it attains a height of 100 to 150 feet. The trunk is quite straight and free from knots, and yields abundant resin. Like many pines, the young trees have branches almost from the ground, but the older ones have tall naked stems with a crown of branches. The timber is heavy, solid, hard, fibrous, yellowish white, and beautifully veined. It is very suitable for masts of ships. The resin, which is white, has a smell like frankincense, and a not unpleasant taste. The seed is pleasant to the taste, not unlike the chestnut and is a most important article of food to the Indians. The generic name is derived from that of a tribe, the Araucanians, who especially use it as food, raw, boiled, or roasted. A spirituous liquor is also distilled from it. A single cone sometimes contains between two and three hundred seeds, and one tree may be seen loaded with twenty or thirty of these. This araucaria was introduced into Britain in the end of last century, and is now frequently planted, especially in small villa gardens, but for which its stilly symmetrical and unvaried form is, however, peculiarly unsuitable. It is the only species which can at all withstand the climate of Britain. It requires a well-drained soil, and is apt to suffer in severe winters. *A. brasiliana*, the Brazil pine, has a

looser and more spreading habit than *A. imbricata*. The seeds are sold as an article of food in Rio Janeiro, and the resin which exudes from the tree is mixed with wax to make candles. *A. excelsa*, the Norfolk Island pine, attains a height of 160 to 220 feet, free from branches to 80 to 100 feet, and with a trunk sometimes 11 feet in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. *A. Cunninghamii*, the Moreton Bay Pine, a native of New South Wales, very much resembles the last. It attains a height of 60 to 130 feet, and a diameter of 4 to 8 feet. The wood is yellowish, and is used for boat-building, house-carpentry, and the common kinds of furniture. The large seeds of *A. Bidwillii* are used for food by the natives at Moreton Bay.

Certain fossil Coniferae found in carboniferous sandstone have received the names *Aracarioxylon*, &c., and are closely allied to the existing forms, which, in fact, represent far more nearly than do any other trees the primitive forms of the palæozoic age. Livingstone found such fossils in abundance on the Zambesi, and great trees of this type are not uncommonly discovered in the carboniferous quarries around Edinburgh.

Arauró, a town of Venezuela, South America, 60 miles ENE. of Truxillo, in a region noted for its fertility in the production of cotton, coffee, cattle, &c. Pop. about 10,000.

Aravalii, a range of mountains in Western India, extending for 300 miles in a north-easterly direction through Rajputana. They consist of a series of ridges and peaks, many of them mere heaps of sand and stone, for the most part bare of cultivation. The highest summit is Abu (q.v.), 5650 feet.

Arbalest. See CROSSBOW.

Arbe'la, now Erbil or Arbil, a small town of Assyria, east from Mosul, famous as having given name to the battle in which Alexander finally defeated Darius, 331 B.C. The battle was really fought near Ganganela (the 'camel's house'), to the NW. of Arbela.

Arbitration is the adjudication by private persons appointed to decide a matter or matters in controversy, on a reference made to them for that purpose, either by agreement of the disputants, or by the order, or on the suggestion, of a court of law. The proceeding generally is called a *submission to arbitration*, or *reference*; the parties appointed to decide are termed *arbitrators* or *referees*; and their adjudication is called an *award*. This mode of settling disputes is not only frequently resorted to by litigants themselves, who are anxious to avoid the delay and expense of proceedings in the public tribunals, but the Statute book bears witness to the approval of it by the legislature at various times. An old act, the 9 and 10 Will. III. chap. 15, attests the benefits of arbitration in strong terms, and it proceeds to authorise and encourage merchants, traders, and others to put an end to their controversies and quarrels by means of arbitration; and an act of 1833 contains still more anxious provisions for rendering reference to arbitration effectual. Since that act was passed, the practice and feeling in favour of arbitration has increased, so much so that there are recent statutes which contain provisions rendering arbitration, or private reference in certain cases, compulsory. The Railway Acts of 1845, the Public Health Act of 1848, Common Law Procedure Act of 1851, and Judicature Act, 1873, are modern examples of this legislation. Masters and workmen are specially empowered by an act of 1825, amended in 1872, to refer disputes to arbitration.

The matters that may be determined by an arbi-

trator are all personal disputes and differences which might otherwise be made the subject of controversy in the courts of civil jurisdiction. Thus breaches of contracts generally, breaches of promises of marriage, trespass, assaults, charges of slander, differences respecting partnership transactions or the purchase price of property, and questions relating to tolls or the right to tithes, may all be referred to arbitration. Questions relating to real property may also be referred, such as those relating to the partition of lands of joint tenants or tenants in common, to settlements of disputed boundaries—to differences between landlord and tenant respecting waste—and to the title to land. Pure questions of law may also be referred to the decision of an arbitrator. An arbitrator may have, therefore, to determine the liability of a party on a promissory-note or bill of exchange, or to construe an act of parliament, or to give a judicial opinion on the effect of a will or deed. Actions at law, and suits in equity, may also be settled by arbitration; and this kind of reference may be made at any stage of the proceedings, sometimes even after verdict, and probably by analogy, after decree in equity. Questions relating to the future use and enjoyment of property, and future or anticipated differences between parties, may likewise be referred. Trade disputes between employers and workmen are now frequently referred to arbitrators.

A matter clearly illegal, or contrary to public policy, cannot be made the subject of a valid reference. But where transactions between parties have been brought to a close by a general award, apparently good, the courts have refused to reopen them on a suggestion that some illegal item has been admitted in account. Among the questions that cannot be referred to arbitration are matters arising out of the administration of the criminal law in the case of felonies. Felonies and offences of a public nature cannot be referred, because the public safety and good require them to be punished, and for this purpose they can only be properly tried in one of the ordinary courts of the country.

There are certain matters which are specially referred to arbitration by statute. Besides those we have already alluded to, the following matters are all referable to arbitration: Questions relating to the expenses of prisoners, under the Prisons Acts, 1865 and 1877; to municipal corporations in England and Wales, under the Municipal Corporations Act, 1882; to savings-banks, under the 26 and 27 Vict. chap. 87; to episcopal and capitular estates, under the acts of 1832 and 1851; to the conveyance of mails by railways, under the 1 and 2 Vict. chap. 98; to insolvents and to insolvency, bankruptcy, and execution, under the Bankruptcy Act, 1883; to companies incorporated for carrying on public undertakings, and to the taking of lands for undertakings of a public nature, under the Consolidation Acts of 1845; to the metropolitan sewers, under the Metropolis Management Acts; and to friendly societies.

Under these acts of parliament, the class of cases which may, or which must, be referred to arbitration has been greatly enlarged. The Railway Acts, in particular, have largely contributed to this kind of amicable determination, although the parties in such cases cannot be said to have much discretion in the matter.

But there are certain misdemeanours which may be either settled by agreement or by means of an arbitration, on a principle of very general application stated by Chief-Justice Gibbs—that where there is a remedy, by action as well as by indictment, a reference of the matter in controversy is good. And in these cases of misdemeanour, a compromise or settlement under a reference may be

made, even after conviction, but with the sanction of the court.

As to the parties who may make a reference to arbitration, it may be stated generally, that every one capable of making a disposition of his property or release of his rights may make a submission to an award, and in this category may be placed a married woman who has property for her separate use, and there are even cases where a reference between a husband and wife has been held valid; and of course a husband may submit to arbitration differences respecting his wife's personal estate which has not been settled to her separate use.

Respecting the powers of infants or persons under age to submit to arbitration, there are numerous decisions in the courts of law and equity; but they go upon refinements and nice distinctions more suited for the professional lawyer than for the ordinary reader, and we therefore do not think it necessary to give any explanation of them in a popular article such as this professes to be.

Partners and corporations may make references to arbitration on the principles already explained, and according to the relation in which they stand to the matter in dispute.

Those who cannot submit to arbitration are persons in the following position: Persons who cannot contract; married women without any estate settled to their separate use; and along with them, as laid down in old pre-Reformation books, persons professed in religion, and persons under duress. There is an exception to the incapacity of married women to refer to arbitration, where the husband, by exile, banishment, or other cause, is held to be civilly dead, and when he is an alien enemy. To these exceptions it may be added, that in suits respecting the property of charities the Court of Chancery will not permit a reference, however advisable such a course may seem, unless the attorney-general give his consent.

It has generally been the opinion of the legal profession, and held to be the doctrine of the courts, that a reference by the consent of counsel in a cause is binding on his client; and Lord Chancellor Eldon once said that it was for the counsel to consider whether he was authorised to refer, and if so, he (the chancellor) would act on the consent so given; and the right and privilege of counsel to make a reference has been very strongly laid down in the Scotch courts. But a notable case in the Court of Common Pleas (*Swinfen v. Swinfen*), where a compromise by counsel was successfully resisted by the client, somewhat unsettled the English law on this subject; and now the feeling of the Bar in England is, that it is unwise to refer or compromise a litigation on the independent authority of counsel.

Submission to reference may also be made by executors and administrators, by trustees, by the committee of a lunatic, and by the officer of a public company, who is authorised by a statute to sue and be sued in the name of the company. And there are persons especially empowered to refer by the statutes which we have already enumerated.

Disputes may be referred to arbitration in any manner that expresses the agreement or understanding of the parties to be bound by the decision of the arbitrator; and for this purpose no formal submission, either verbal or written, is necessary; but the arrangement must be such as manifestly to show an intention to have the difference concluded by a private adjudication in the nature of an award. But where the submission is in writing, it must be executed in due form. A testator, however, cannot exclude his will from litigation by a proviso that all differences respecting it shall be referred to arbitration, although it is thought that the parties benefited by the will might themselves

so refer. Generally speaking, it is advantageous to make the arbitration in such a form as that the award may be made a rule of court—that is, may be adopted by a court of law as its judgment on the matter submitted, a proceeding that affords an obvious facility in enforcing the award; and for this purpose it is necessary to make the procedure conformable to the directions of the statutes 9 and 10 Will. III., and 3 and 4 Will. IV., already referred to. Where the submission is merely verbal or constituted by a private bond or deed, it is liable to be capriciously revoked, and the party injured by the revocation has only an equitable claim to compensation.

The arbitrator ought to be a person who stands perfectly indifferent between the disputants; but there are no other particular qualifications for the office. And the choice by parties of the person whom they agree shall decide between them is perfectly free. Some legal writers have even gone so far as to maintain, that not only infants and married women, but even idiots and lunatics, can be arbitrators, on the argument that every person is at liberty to choose whom he likes best for his private judge, and he cannot afterwards object to the deficiencies of those whom he has himself selected. But this, it is clear, is going too far, and the policy of the law would certainly be interposed against such extreme cases. It is better to state the rule to be, that on the condition that the party selected is of ordinary intelligence, the choice of an arbitrator is absolutely unfettered. The only exception to this rule is the case of a party who, by office or position, is the person pointed out for the duty under a reference made by statute. In matters of complicated accounts, mercantile men are generally preferred. In other cases, it is usual to appoint barristers who, being accustomed to judicial investigations, are able to estimate the evidence properly, to confine the examination strictly to the points in question, and, in making the award, to avoid those informalities in respect of which it might afterwards be set aside. Both time and expense are thus saved by fixing on a professional arbitrator. It has, indeed, been wisely remarked, that an arbitrator should endeavour to arrive at his conclusions upon the same rules and principles which would have actuated the court for which he is substituted a rule of conduct that obviously points to the expediency of a lawyer being the referee. But an arbitrator is not bound by the mere rules of practice which prevail in the ordinary courts of justice, and he has been held justified in allowing interest on both sides of an unliquidated account, although such a determination was against the practice of the Court of Chancery, where the suit, which had been referred, had been commenced.

The proceedings before an arbitrator are regulated according to the peculiar circumstances of the case submitted, but generally it is advisable to conduct them according to the forms observed in courts of law, and they usually are so conducted. Each of the parties furnishes the arbitrator with a statement of his case, and on the day appointed he proceeds to hear them (either in person or by their counsel or attorneys), and to receive the evidence on each side, nearly in the same manner as a judge at an ordinary trial. Having so heard the case, the arbitrator proceeds to make his award, which need not necessarily be in writing, for a verbal award is perfectly valid; but in practice it is usual for the arbitrator to make his award on paper stamped with the proper award stamp, and this he delivers to the successful party. The unsuccessful party gets a copy of the award on unstamped paper. This award in its effect operates as a final and conclusive judgment respecting all the matter

submitted, and it binds the rights of the parties for all time.

An award may be set aside on the ground of corruption and fraud in the arbitrator, and for any material irregularity or illegality appearing on the face of the proceedings. But the tendency of the courts is to favour arbitrations and maintain awards, unless such serious grounds as we have referred to can be substantiated.

Where there are two arbitrators, the submission often provides that in the case of their differing in opinion the matter referred shall be decided by a third person, called an umpire, who is generally appointed under a power to that effect, by the arbitrators themselves. But they cannot make such an appointment unless specially authorised so to do by the terms of the submission. This umpire rehears the case, and for this purpose is invested with the same powers as those possessed by the arbitrators, and bound by the same rules.

In Scotland, an arbitration takes place in virtue of a written submission executed by the parties in favour of the chosen referee, who there is called an arbiter, instead of arbitrator as in England; and his award is called a decree-arbital. This submission is in the form of a regular deed, and is said to be general or special, according to the nature of the matters submitted by it, the submission specifying all the particulars of the reference, and the name of the referee—the arbiter's powers and duties, which, in the ordinary case, are of the most comprehensive character—the specification of the time within which the award or decree-arbital is to be made—a clause obliging the parties to perform the award under a specified penalty; and other provisions, which are all carefully specified in the submission. The case then proceeds before the arbiter, generally according to the forms observed in the ordinary Scotch courts; and the arbiter makes his award in a very solemn manner, the decree-arbital commencing with a recital of the submission and of all the procedure—and after stating that the arbiter has ripely considered the whole matter, and has 'God and a good conscience before his eyes,' it gives the arbiter's judgment, and among other things obtains the submission and decree to be recorded according to the clause of registration in the former, and the extract from the registry so made forms a judgment which may be put in execution by either party against the other. The decree-arbital, like the submission itself, must be executed and attested in the form of a regular deed. Where there are two arbiters, the submission usually provides, that in the event of their differing in opinion, they shall name an umpire or oversman, as he is called in Scotland, whose judgment is final.

In the United States, arbitration is carried out on substantially the same principles as in England. But the several states differ from one another in details. There are state boards of arbitration in some states. From the nature of the case, there can be no appeal to any public tribunal whatever on the merits of a dispute submitted to arbitration. International arbitration has been of late repeatedly had recourse to in matters of debate between nations. Thus, as between Britain and the United States, the San Juan boundary question, and the Alabama (q.v.) dispute were so arranged. The dispute between Spain and Germany as to the possession of the Caroline Island was settled in 1885 by the arbitration of the pope. Diplomatic conference, which often obviates war, belongs to a different category. See INTERNATIONAL LAW.

Arboga, an ancient town in Sweden, in the province of Westmanland, on a small river of the same name, by which, with the aid of a canal, the

lakes Hielmar and Mälar are united, 101 miles WNW. of Stockholm by rail. Once an important commercial town, it has now sunk into insignificance. Its town church contains an altar-piece of Rembrandt's. Pop. (1881) 3823.

Arbois, a town in the French department of Jura, 7 miles N.E. of Poligny by rail. It was the birthplace of Pichogru. Pop. (1881) 4639.

Arbor Day, in America, a day set apart for the planting of shade trees, shrubs, &c. by school children. Trees for transplanting are given by farmers and other friends of the children; or excursions are made to the nearest wood, and saplings of forest trees brought back. Millions of trees have been planted, and the institution is expected to add to both the beauty and salubrity of the towns especially. The first Friday in May has been selected for this purpose in Canada; in the United States, different days are chosen in the several states.

Arborescent (Lat. *arbor*, 'a tree'), a term applied to plants to signify that they possess either altogether, or in some measure, the character of trees. Even the dwarf willows and birches, on the confines of polar or alpine perpetual snow, are described as the arborescent vegetation of these regions.

Arboriculture, a term literally signifying the cultivation of trees, is in use generally restricted to the planting and management of timber trees, exclusive of the cultivation of fruit trees, which is a branch of horticulture or gardening.

The ancients practised arboriculture to some extent, but chiefly with the view of beautifying their villas, or of forming public walks in the vicinity of cities. The planting of timber trees for economical purposes, or with a view to profit, is unnecessary whilst natural forests are abundant, and can scarcely be referred, even in Britain, to an earlier period than the beginning of the 16th century, nor did it become general till a much later date. The early forest laws of England, as of other feudal countries, had reference chiefly to game, for the sake of which large tracts were depopulated and converted into *forests* by the first Norman kings. Plantations for timber and fuel were, however, made in England in the 16th century; and the importance of the subject was urged on public attention by authors of that period. In the 17th century, the greatly increased demand for oak, for the building both of ships and of houses, gave a new impulse to arboriculture, which attracted the attention at once of the government and of the great landowners: the publication of Evelyn's *Sylva* also rendered an important service in promoting a taste for it; and the next great work was London's. Nurseries for forest trees were first established in this century. It was not until the beginning of the 18th century that the first extensive plantations were made in Scotland, nor until towards the end of that century that arboriculture became general in that country or in Ireland. How much the landscape has been changed by the introduction of foreign trees, it is not easy to imagine; and how much these changes have promoted and are indicative of improvements in agriculture and increased productiveness of land, is difficult to estimate.

In Britain, arboriculture, or the planting and tending of single trees, has been better understood than *silviculture*, or the reproduction by seed and training of natural forests. In France and Germany, attention has long been paid to silviculture by conserving the indigenous woods. Without systematic management of these tracts, many districts of these countries would soon be destitute of fuel, and by means of it an increased supply of

timber is obtained, and extensive domains belonging to the state or to private proprietors are rendered more productive.

The forest trees of Britain, and of temperate climates generally, are conveniently divided into two classes—the one consisting of coniferous trees, or pines and firs (*Nadelholz*—i.e. the ‘needlewood’ of the Germans), the other including all other kinds (*Laubholz*—i.e. the ‘leaf-wood’ of the Germans); the latter being sometimes subdivided into *hard-wooded trees*, of which the most important in Britain are oak, ash, elm, beech, birch, hornbeam, sycamore, walnut, and chestnut; and *soft-wooded trees*, as willow, poplar, lime, and horse-chestnut. Of these and other trees, of their particular uses, and of the soils and situations to which they are adapted, notice is taken in separate articles.

Plantations are generally formed in Britain by means of seedlings raised in a nursery; but sometimes also by sowing the seed on the ground intended for the plantation; in which case, a crop of grain is often sown along with the seeds of the trees, as these do not in general vegetate very soon; and the young plants derive advantage from the absence of weeds when the grain-crop is reaped, and from the protection afforded by the stubble. However, only very small trees can be planted with advantage, those which have attained a greater size requiring more attention than is possible in plantations even of moderate extent. The time of planting is in spring or autumn. The most approved mode of planting is in small pits, in which the roots are disposed in a natural manner, and which are then carefully filled up with earth; but it is often sufficient, when the seedling to be planted is very young, to make a slit for it with the spade, or two slits, one at right angles to the other in the form of the letter T. Other methods are adopted, particularly for rocky situations, in which the spade cannot be used. Economy is a consideration of great importance in determining the mode of planting.

The formation of plantations by the sowing of seed is more generally practised on the Continent than in Britain. In this way the vacancies in the natural forests of France and Germany are filled up, and great sandy tracts have been covered with wood on the coasts of Denmark, Prussia, and France. This has been accomplished on a scale of extraordinary magnitude in the dunes of drifting sand, between the rivers Adour and Gironde. The operations begun by M. Bremon tier in 1789 deserve to be mentioned, as perhaps the most important operations in arboriculture that have been performed in the world. Vast forests of pinaster now occupy what was originally loose sand destitute of vegetation. In recent times, the planting of teak, cinchona, sandalwood, eucalyptus, and deodar, by the Forest Department in India, is a work of great utility, and has already been a financial success.

Too little attention has been paid to the adaptation of the kinds of trees that are planted to the soil and climate; and to this cause many failures in arboriculture may be ascribed. Some trees grow well even in exposed situations, and are fit to be employed either to form entire plantations, or to occupy the outer part, and so to shelter other trees, which in general are not planted until the outer zone or belt of the most hardy kinds is somewhat advanced; some succeed only in rich soils; some are incapable of enduring the sea-breeze; others, as the sycamore, the elder, and the pinaster, are comparatively unaffected by it. Some trees suffer from an amount of moisture from which alders or willows would rather derive advantage; but, in general, the thorough drainage of the land intended for a plantation is important to its success.

We must look to the necessity of drainage, especially of marshy soils, as compensating the influence which woods exercise in condensing the moisture of the atmosphere, and in rendering a climate cold and damp. The shelter afforded by plantations judiciously disposed, whether in belts or otherwise, is also of great importance in rendering soils suitable for that improved agriculture in which thorough drainage is of the first necessity, and which is always productive of amelioration of climate. The influence of plantations is therefore beneficial, although vast masses of forest are injurious to climate; and it must be admitted that in some localities the planting of trees has been carried to excess, so that fields often suffer, particularly in autumn, from want of free circulation of air.

Much has been written about the pruning of forest trees, with a view especially to the production of taller and straighter stems; and considerable difference of opinion exists as to the extent to which pruning should be practised. It is, however, generally delayed till the branches to be removed have attained too great a size, and is then rudely performed, to the spoiling of the timber rather than to the improvement of it. The practice of leaving *snags*, instead of cutting branches clean off, has injurious effects. Pines and firs, from their manner of growth, need pruning less than trees of other kinds. When trees have been planted, not for profit but for ornament, this ought to be remembered in pruning, which, however, is often intrusted to persons utterly devoid of taste; and trees which were very beautiful in nature, are so treated with axe and saw that they become unsightly deformities.

In forming plantations, different kinds of trees are generally mixed, although masses of one particular kind are also frequently planted. It is usual, however, to plant along with those which are destined permanently to occupy the ground, trees of other kinds as *nurses*, to be gradually removed as the plantation advances in growth. For this purpose, spruce and larch are generally employed; although Scotch fir and birch are also deemed suitable for certain situations. The removal of some of these nurses affords the first return of profit from the plantation, which is afterwards thinned from time to time. Plantations more frequently suffer from being thinned too little, than from being thinned too much. To the want of proper thinning is to be ascribed the failure of many of those narrow belts of *planting* which are too common in Scotland, and which, having been intended for shelter, serve their purpose but imperfectly, and seem to have suffered from maltreatment. The thinning of a plantation which has been allowed to grow too thick, must, however, be gradually performed, that it may be beneficial and not injurious. After a sudden thinning, a plantation sometimes ceases to thrive, and many trees are laid prostrate by the next storm; for trees accommodate themselves both in their roots and branches to the situations in which they grow.

A considerable number of years must elapse before any pecuniary return is derived from a plantation, yet the planting of unculturable land is often found to be the most remunerative of which they are capable, even without reference to the improvement of adjacent lands to which shelter is afforded. The resinous products of pine-woods are not considered as a source of profit in Britain; but the tar, turpentine, and resin obtained from them in some parts of Europe form articles of commerce.

The wholesale destruction of forests in the United States brought about serious evils; and of late, measures have been taken, both by public autho-

rities and private persons, for cherishing existing trees and woods, and for planting extensively where the ground is bare of timber. In some of the western states especially, where the need of shelter for horses, crops, and cattle has been found in increasing measure, the movement is now carried on on a very large scale, trees being planted by millions annually.

The employment of trees for ornamental purposes belongs not so much to arboriculture as to Landscape Gardening (q.v.). The Transplanting (q.v.) of large trees is only practised for ornamental purposes. Hedgerow trees are planted chiefly for ornament, although sometimes they afford useful shelter; but where this is not the case, they can seldom be reckoned profitable, as they are injurious to crops. Copse (q.v.) or coppice-wood differs much, both in its uses and in the mode of its management, from other plantations.

There is a great school of forestry at Nancy, to which English students used largely to resort; and Germany and most European countries have special forestry schools. The Forestry Exhibition at Edinburgh in 1884 created some popular interest on the subject. In 1887, a committee appointed by the House of Commons recommended the establishment of a Forestry Board and national school in England.

Certificates in forestry are granted by the Highland and Agricultural Society of Scotland, whose *Transactions* contain valuable papers on arboriculture; and at the Indian Engineering College, Cooper's Hill, Staines, a course of two years' training is arranged for forest candidates preparing for the Indian Forest Department. See Brown's *Forester*, Grigor's *Arboriculture* (2d ed. 1881); and for sylviculture, the *Elements of Sylviculture*, by Bagnieris (Eng. trans. 1882).

Arbor Vitæ (*Thuja*), an evergreen genus of coniferous trees and shrubs allied to the cypress. The common Arbor Vitæ (*T. occidentalis*) is a native of North America, especially between lat. 45° and 49°, but has long been well known in Europe. It is a tree of 20 to 50 feet high; the young leafy twigs have a balsamic smell, and both they and the wood were formerly in great repute as a medicine; the oil obtained by distillation from the twigs, which has a pungent and euphor-like taste, has been employed as a vermifuge. The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bearing exposure to the weather remarkably well. The tree is often planted in Britain as an ornamental tree, but does not attain so great a size as in its native country. It delights in cool, moist situations.—The Chinese Arbor Vitæ (*T. Bioti orientalis*), a native of China and Japan, which is immediately distinguishable from the former species by its upright branches and larger, almost globose and rough cones, is also a common ornament of pleasure-grounds in Britain and on the Continent; but it does not grow so tall as the preceding, and is more sensible of the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin having a pleasant odour, to which high medicinal virtues were formerly ascribed; hence the remarkable name, *Arbor Vitæ* ('tree of life'), given to this species, and extended to the genus. In its native country, this species also attains the size of a considerable tree.—There are several other species of *Thuja*, some of which seem well suited to the open air in the climate of Britain, and others require the protection of greenhouses. See CONIFERÆ; ARAUCARIA, CEDAR, CYPRESS, SANDARACH.—When the human cerebellum is cut vertically, a tree-like appearance seen is called *arbor vitæ*.

Arbroath, ABERBROTHWICK, or ABERBROTHOCK, a seaport and manufacturing town of Forfar-

shire, at the mouth of the Brothock Burn, 17 miles ENE. of Dundee. Here in 1178 William the Lion founded a Tyronensian abbey in honour of Becket; and here in 1214 he was buried. Cardinal Beaton was the last of its thirty-two mitred abbots. Next to Holyrood, the abbey was the most richly endowed monastery in Scotland. It was destroyed by the Reformers in 1560. The ruins of its cruciform church, which measured 276 by 160 feet, and was mainly Early English in style, are very picturesque, presenting a noble west doorway and a rose-window, 'the round O of Arbroath.' Dr Johnson greatly admired them in 1773. The chief industries of Arbroath are flax-spinning, jute-spinning, the manufacture of sail-cloth and linen fabrics, in which about one-fifth of the population is employed. The new harbour, begun in 1841, admits vessels of 400 tons; the old harbour was converted into a wet-dock (1871-77). The tonnage of vessels entering the port annually ranges between 35,000 and 45,000. The chief exports are grain, potatoes, fish, pork, and paving-flags; the chief imports are coal, flax, hemp, jute, and hides. Arbroath is a royal burgh, and in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to parliament. Arbroath is the 'Fairport' of *The Antiquary*; Anclunthie, 3½ miles to the NE., is its 'Musselcrag'; and the Redhead Crags and Coves form some of the scenes in that novel. The famous Bell-rock (q.v.) is 12 miles SE. Pop. (1831) 13,795; (1861) 17,593; (1881) 21,758. See Miller's *Arbroath and its Abbey* (1860); and Hay's *History of Arbroath* (1876).

Arbroath Flags, the name given to a series of thin-bedded gray sandstones and flagstones which occur in the Lower Old Red Sandstone of Forfarshire. The remains of a number of ganoid fishes have been obtained from the Arbroath flags. The strata have been extensively quarried in Forfarshire for flagstones, which, however, are of a somewhat softer quality than the flagstones obtained from Caithness. They are most commonly employed for inside pavements, &c.

Arbuthnot, or ARBUTHNOTT, JOHN, physician and wit, the friend of Swift and Pope, was born at Arbuthnot, in Kincardineshire, in 1667. He studied medicine at Aberdeen, but took his M.D. degree at St Andrews (1696). He removed soon after to London, and there supported himself by teaching mathematics. In 1697 he published an *Examination of Dr Woodward's Account of the Deluge*, which brought him into notice as a man of no common ability. Accident called him into attendance on Prince George of Denmark; in 1705 he was appointed physician-extraordinary to the queen, and her death in 1714 was a severe blow to his prosperity. In 1715, along with Pope, he assisted Gay in *Three Hours after Marriage*, a farce that, in spite of the trio of wits, proved a complete failure. He pronounced the Harveian oration in 1727, and died 27th February 1735. Arbuthnot was one of the leaders in that circle of wit which adorned the reign of Queen Anne, and was still more nobly distinguished by the rectitude of his morals and the goodness of his heart. He was one of the kindest and truest of friends. 'If there were a dozen Arbuthnots in the world,' wrote Swift to Pope in 1725, 'I would burn my Travels.' Utterly careless of literary fame, he was the chief, if not sole author of that brilliant satire, the *Memoirs of Martinus Scriblerus*, first published in Pope's works (1741); and his too was the celebrated political *jeu d'esprit*, the *History of John Bull* (1712), which has so often been imitated. Among his scientific works, the essays *On Aliments* (1731) and *Concerning the Effects of Air on Human Bodies* (1732) possess

much merit. The latter particularly displays a deep knowledge of physiological laws. See a long article in the *Asclepiad* (1887).

Arbutus, a genus of small trees and shrubs belonging to the order Ericaceæ. *Arbutus unedo*, the Strawberry Tree, is a native of the south of Europe, found also in Asia and America, and in one



Arbutus unedo :
a, fruit; b, section of fruit.

locality in the British Isles, the Lakes of Killarney, where its fine foliage adds much to the charm of the scenery. In Britain, it is often planted as an ornamental evergreen. It grows to the height of 20 to 30 feet, but is rather a great bush than a tree. The bark is rugged; the leaves oblong-lanceolate, smooth, shining, serrate; the flowers nodding; corolla urn-shaped, greenish white; the fruit scarlet, somewhat resembling a strawberry, with a vapid sweetish taste. A wine is made from it in Southern Europe, which, however, is narcotic, as the fruit itself is when eaten freely. The bark and leaves are astringent. *Arbutus Andrachne* is also sometimes cultivated as an ornamental plant in Britain, but is impatient of severe frosts. Its fruit, and that of *Arbutus integrifolia*, are eaten in Greece and the East. But all the species seem to possess narcotic qualities, the fruit of *Arbutus furens*, a small shrub, a native of Chili, so much so as to cause delirium. *Arbutus aculeata* (Cape Horn) is an elegant evergreen, resembling the myrtle; and the *Arbutus Menziesii*, or madroña tree of Western North America, is a very interesting and beautiful species.

Arc. See JOAN OF ARC.

Arc (Lat. *arcus*, 'a bow') is any part of a curved line. The straight line joining the ends of an arc is its *chord*, which is always less than the arc itself. Arcs of circles are *similar* when they subtend equal angles at the centres of their respective circles; and if similar arcs belong to equal circles, the arcs themselves are *equal*. The length of an arc is readily found if the angle which it subtends at the centre of the circle is known, and also the length of the whole circumference. Let the whole circumference be 100, and the angle of an arc 50°, the length of the arc is

$$\frac{360^\circ : 50^\circ}{100} = \frac{100 \times 50}{360} = 14 \text{ nearly.}$$

Arcæa, or ARK-SHELL, a genus of lamellibranchiate molluscs. See LAMELLIBRANCHIATA.

Arcachon, a bathing-place which has grown up since 1854, on the south side of the Bassin d'Arcachon, 34 miles SW. of Bordeaux by rail.

The fine broad sands are admirably adapted for bathing; and the place is sheltered by sand-hills, covered with extensive pine-woods, in which game abounds. Its main street stretches 2½ miles along the shore, with the pine-forest immediately behind. The climate is always temperate, and the rainfall is but 32 inches. Its numerous villas amongst the firs are much frequented in winter by invalids afflicted with lung disease. Scientific oyster-culture is practised here on a large scale. There are 3300 oyster 'parks' in the lagoon, lined with 6000 oyster tiles for the collection of oyster spat, and calculated to yield two hundred millions of infant oysters in a single season (see OYSTER). Pop. (1876) 4934; (1881) 7087.

Arcade (Fr.), a row of arches supported by columns, either having an open space of greater or less width behind them, or in contact with masonry. The arcade in Gothic corresponds to the colonnade in classical architecture. The term arcade is sometimes applied to the row of piers, or columns and arches, by which the aisles are divided from the nave of a church, or by which cloisters, or what are erroneously called piazzas in Britain, are inclosed; but it is more generally confined to those series of smaller arches which are employed simply for purposes of ornamentation. Arcades of the latter kind are often found surrounding the square towers of English churches. The term is also applied, but improperly, to a glass-covered street or lane, with a row of shops or stalls on each side.

Arcadia, the central and highest part of the Peloponnesus, was in length about 50 miles, in breadth about 40. According to Pausanias, it derived its name from the eponymous hero Arcas, the son of Callisto. Next to Laconia, Arcadia was the largest country in the Peloponnesus. It was girt round by a ring of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions. The western part of what was anciently Arcadia is wild, bleak, and rugged; the eastern is more fertile. The loftiest peak in Arcadia—the loftiest also in the Peloponnesus—is Mount Cyllene, in the north-east (7787 feet). The chief river is the Alpheus (q.v.). The modern province of Arcadia has an area of 2020 sq. m., and a pop. (1879) of 148,905. Originally Arcadia was named Pelasgia, after its first inhabitants, the Pelasgi. Subsequently, it was divided into several small states, which formed a confederation. Of these, the chief were Mantinea, Tegea, Orchomenos, Pheneus, and Psophis. The inhabitants, engaged chiefly in tending cattle and in hunting among the wild highlands, remained long in a state of barbarism. They were passionately fond of music and dancing, and were especially devoted to the worship of Pan and Artemis. Arcadia became both to ancient and modern poets the land of peace, innocence, and patriarchal manners; but the Arcadian shepherds of modern pastoral poetry harmonise but indifferently with the barbarous hill-men of ancient Arcadia.

Arcadius, first emperor of the East alone, was born in Spain, 377 A.D., and was the son of the Emperor Theodosius, after whose death in 395 A.D. the Roman empire was divided into East and West, the West falling to Honorius. Arcadius lived in oriental state and splendour, and his dominion extended from the Adriatic Sea to the river Tigris, and from Scythia to Ethiopia; but the real rulers over this vast empire were, first, the Gaul Rufinus, and afterwards the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while the emperor reposed in luxurious indifference. In 399 Eutropius was for a time supplanted by another usurper, Gainas; and afterwards,

Endoxia, the wife of the emperor, assumed the supremacy. The great archbishop, Chrysostom, was exiled by Endoxia in 404, because of his stern denunciation of vice. During the reign of Arcadius, his territories suffered by barbarian incursions, earthquakes, and famine. He died in 408 A.D.

Arcani Disciplina. See DISCIPLINA ARCANI.

Arcaum. THE GREAT. In the middle ages, the Latin word *arcaum* ('secret') was used of any of the most valued preparations of alchemy; but the title was especially applied, as above, to the highest problems of the science, the discovery of such supposed great secrets of nature as the grand elixir. See ALCHEMY.

Arcesilaus, a Greek philosopher, founder of the New Academy, was born at Pitane in Eolia, Asia Minor, 316 B.C. He studied philosophy, first under Theophrastus the Peripatetic, and afterwards under Crantor. He ultimately became the head of the Academic school, or those who held the doctrines of Plato; but he introduced so many innovations that its philosophic character was completely changed in the direction of scepticism. His great rivals were the Stoics. He denied the Stoical doctrine of knowledge, which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the existence of any sufficient criterion of truth, such as the 'irresistible conviction' of the Stoics, and recommended abstinence from all dogmatic judgments. In practice he maintained that we must act on grounds of probability. It is not easy to determine satisfactorily what his theory of morals was. A wit, a poet, and a man of frank and generous disposition, which seems to have captivated his disciples even more than his philosophy, he was yet accused of the grossest profligacy. He died in his 76th year (241 B.C.).

Arch. JOSEPH, was born at Barford, Warwickshire, in 1826, and whilst still a farm-labourer, became a Primitive Methodist preacher. In 1872 he founded the National Agricultural Labourers' Union, and thereby, according to Mr Justin McCarthy, began the emancipation of the rural labourers. He afterwards visited Canada to inquire into the labour and emigration questions; and for half a year (1885-6) he represented the north-west division of Norfolk. See Heath's *English Peasantry* (1874).

Arch. a concave structure of bricks, stones, or other materials built or turned on a centring over an open space, and so arranged as to support each other by mutual pressure, and to sustain a superincumbent weight. Wilkinson says that the arch was known to and used by the ancient Egyptians; and the Assyrians were acquainted with its principles. The arch was not unknown to the Greeks, though they did not employ it generally in their architectural structures. It is to the Romans that the nations of modern Europe are indebted for the use of the arch. The Romans most probably derived their acquaintance with it from the Etruscans, who, as well as the Pelasgians (q.v.) of Greece, made their arches pointed. The introduction of the arch by the Romans gradually effected a complete revolution in the architectural forms which they had borrowed from the Greeks. The predominance of horizontal lines gave way by degrees, till, in the works of the late empire, such as the palace of Diocletian at Spalatro, the entablature was entirely omitted, and the arch-vault sprang from the capital of the columns. The Greek traditions of architrave, frieze, and cornice were thus at last got rid of, and in the Romanesque and Gothic styles the arches sprang freely from the caps of the shafts. A very simple structure, frequently met with in the so-called Saxon early edifices in our own country,

consists of two stones, their lower ends resting on rude piers, their tops leaning against each other, and thus forming two sides of a triangle, which is capable of supporting a moderate superincumbent weight. It is not impossible that out of this rude construction the arch, in its later and more elaborate forms, may have developed itself.

Of the arch itself, the following variations of form may be enumerated: the semicircle (1), the segment (2), the ellipse (3), which were the only forms employed by the Romans, and which alone were known in mediæval architecture up to the time at which the pointed arch was introduced. The stilted arch (4) and the horseshoe arch (5) are modifications of these, and in both the centre or point



1. Semicircle.



2. Segment.



3. Ellipse.



4. Stilted Arch.



5. Horseshoe Arch.

from which the arch is described is above the line of the impost; but in the former the mouldings are continued downwards vertically, whilst in the latter they are slightly inclined inwards, or the curve is prolonged till it meets the impost. The horseshoe arch belongs peculiarly to Arabian Architecture (q.v.), not only from its having been adopted along with the faith of the Prophet, but from its continuing to be used exclusively by his followers. The pointed arch, as we have seen, was employed by the Pelasgians, and examples are also found in Egypt and Persia of very early date. It was probably introduced into Western Europe by the Mohammedans, and was universally employed in the vaults of the churches of Provence from the 10th to the 12th century. This arose from its being simpler of construction than the round vault. In the 12th century this form was adopted in Northern France, and was soon developed into the Gothic style (q.v.). The greater or less acuteness of the pointed arch depends on the position of the two centre points from which its curved sides are described. Its various proportions will be better understood from the accompanying diagrams (6, 7, 8, 9) than from any verbal description.



6. Equilateral Arch.



7. Lancet Arch.



8. Drop Arch.



9. Segmental Arch.

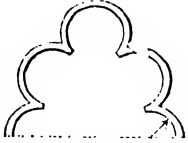
Of the foil arches (10, 11, 12, 13, 14), or arches in which the forms of a leaf are imitated, the first three are examples of the trefoil, the fourth of the

cinquefoil, and the fifth of the polyfoil, the last being met with in Arabian and Romanesque buildings. At a later period of Gothic architecture,



10, 11, 12. Trefoil Arches.

with the decorated style, the ogee arch (15) was introduced, and the Tudor or four-centred arch



13. Cinquefoil Arch.



14. Polyfoil Arch.

(16) appeared about the commencement of the Perpendicular style. When first introduced, the



15. Ogee Arch.

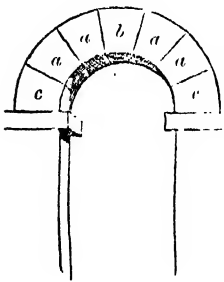


16. Tudor Arch.

proportions of this arch were bold and effective; but it was gradually depressed till the principle of the arch was lost, and its very form was again merged first in three, and then in one flat stone or lintel over an opening. With the last form of the Tudor arch we thus reach almost the point of departure in the construction of the arch, and complete our enumeration of its forms.

The sides of an arch are termed *haunches* or *flanks*, and its highest part is called the *crown*.

The wedge-shaped stones, bricks, or other materials of which an arch is constructed, are called *voussoirs* (*a, a, a*); the uppermost one of all (*b*) is called the *keystone*; the lowest, which is placed immediately over the impost, the *springer*, (*c*), or springing-stone; the under or lower side of the voussoirs, the *intrados*; the upper side, the *extrados* or *back*. For the mechanical principle of the arch, and of the conditions of stability, reference must be made to works on mechanical engineering. See also BRIDGE.



BUTTRESS.

Arch, TRIUMPHAL, a structure erected by the Romans across roads, or at the entrance of cities, in honour of victorious generals. The earliest triumphal arches were two erected by L. Septimius (196 B.C.) in the Circus Maximus and the Forum Boarium. Under the emperors, these structures became numerous and magnificent, and were decorated with bas-reliefs and inscriptions. Of nearly forty that were built during that period, at least three remain, those of Titus (*circa* 82 A.D.), Septimius Severus (203 A.D.), and of Constantine (306-337 A.D.). Numerous similar monuments

exist also in other parts of the old Roman empire, as at Rimini, Susa, Verona, Ancona, Orange (in France), Capua (in Spain). Napoleon proposed to adorn Paris with four triumphal arches, and erected in 1806 the Arc de Triomphe du Carrousel, between the Louvre and the Tuileries, after the model of the arch of Septimius Severus. The Arc de Triomphe de l'Étoile, beyond the Champs Élysées, was begun at the same time, but not completed till 1836. Through it the Germans marched on their entry into Paris in 1871. In London there is the Marble Arch, transferred to Hyde Park in 1851 from Buckingham Palace, where



Arch of Titus.

George IV. erected it at a cost of £80,000. It resembles the Arch of Constantine.

Archæan System forms, in Geology (q.v.), the basement division of the stratified series of rocks. The rocks included under archæan system consist principally of crystalline schistose rocks, and attain a thickness of many thousand feet. There is invariably an *unconformity* between them and the strata which happen to rest upon them. It is quite possible that some of the regions of crystalline schists which are described as belonging to the archæan system may really pertain to a later date because all that can be asserted of such crystalline schists is that they are older than the strata which immediately overlie them. Sometimes these overlying strata are of older, sometimes of younger Palæozoic, or even of Mesozoic and Cainozoic age. Two groups are recognised in the archæan system—the *lower* or 'old gneiss formation,' consisting principally of coarsely crystalline gneiss, along with hornblende-schist, quartzite, and crystalline limestone. The *upper* group, or 'crystalline schist formation,' comprises chiefly mica-schists, chlorite-schists, talc-schists, phyllites, and occasional conglomerates. The archæan system is well developed in many different parts of the globe. It covers considerable areas in the Outer Hebrides and the western parts of Ross and Sutherland, and much more extensive regions in Scandinavia, Finland, and the NW. of Russia. Archæan rocks also form the core or central portion of many mountain-ranges, as the Ural, the Carpathians, the Alps, the Pyrenees, &c. They appear also in many of the hilly tracts of Middle Europe, as in Saxony, Bohemia, and Bavaria. In North America they extend from the region of the great lakes north to the arctic circle, and they also form the nuclei of

many mountain-ranges in the same country. They have been recognised in the coast-ranges of Brazil, in Venezuela, and the Andes; and they likewise occur in India and New Zealand. In Central Europe the lower group passes up conformably into the upper group. But in Canada there is a marked unconformity between the two series—the *lower* (termed Laurentian) attaining a thickness of 30,000 feet, and the *upper* (Huronian), a thickness of 10,000 to 20,000 feet. In one of the crystalline limestones of the Laurentian group, occur the remains of what is believed by Sir W. Dawson and others to have been a massive reef-building Foraminifer (*Eozoön*, q.v.). Other observers deny the organic origin of *Eozoön*, and are of opinion that it is entirely a mineral structure (ophtalcite). By the latter, the archæan system is sometimes spoken of as the *Azoic* (Gr., 'without life') system or formation. Those who think that *Eozoön* is really a fossil, occasionally call the great series of rocks in which it occurs the *Eozoic* formation.

The archæan rocks are often penetrated by mineral veins from which large supplies of various metals have been obtained. Great masses of iron-ore form a marked feature of the archæan system in Canada.

Archæology (Gr. *archaios*, 'ancient,' and *logos*, 'a discourse') is the science which deduces a knowledge of past times from the study of their existing remains. The materials of the science are the relics of the human life of all former ages. Its methods, like those of the natural sciences, are both deductive and inductive. It regards the products of human handicraft which it investigates as manifestations of the ability and purpose of the men who made them. When these products are compared among themselves, the investigation proceeds to the determination of types, and their arrangement in a classified system. Comparison of the classified groups discloses gradations of adaptation and development of character which determine the sequence of the types. These sequences are tested by the associations of characteristic examples in the deposits in which they are found; and the general result is the recovery of such a logical story of the progress of culture and civilisation as the surviving relics of bygone ages are capable of disclosing. But the story thus recovered is not history. It proceeds by simple sequences, and not by a chronological specification of dates and measurement of durations. History deals with events and incidents as manifestations of human motive and action; archæology deals with types and systems as expressions of human culture and civilisation. The archæology of a historic period may be capable of illustrating and supplementing the records of contemporary historians by disclosing a multiplicity of unchronicled details relating to the common life of the people, of which we should have been otherwise left in ignorance. The historic or non-historic character of the time to be investigated has, however, no bearing on the methods of its archæological investigation. These are the same for all times and for all areas. But, as in other sciences whose materials are universally distributed, there is necessarily a limitation of its deductions to the special area investigated. The results of observation show that widely separated areas are characterised by widely different archæological types. As in Zoology or Botany it cannot be predicted of a typical form that it may not vary, or cease to exist in other areas, so neither can it be affirmed of an archæological type that it will necessarily be constant over any hypothetical area. The question which is always to be determined is, **What is the area of the occurrence of the type?**—

and this is a question of observation, and not of induction. And as archæological types not only differ in different areas, but are known to have differed widely at different times within the same area, it is clear that the science must necessarily imply a series of investigations carried to completely exhaustive results in many different areas of the earth's surface before they can be compared and combined to form a science of archæology in its general or universal sense. But as no single area has yet been exhaustively investigated, the practical scope of archæology, for the present, may be defined to be the prosecution of the investigation to exhaustive results on their own areas by the more cultured nations. The basis of all scientific knowledge of archæology in every national area must be such a general collection of the remains of its human occupation as will be completely representative of all the various manifestations that have characterised the progress of its people towards the existing culture and civilisation. Hence in every country in which culture is not at a low level, a national collection of the monuments and relics of the progress and development of its national culture is now in process of formation. As the scientific knowledge disclosed by these national collections must necessarily increase in precision and value, according to the nearness of the approach of the collection to a thoroughly exhaustive representation of the area from which it is drawn, the science must be progressive in its results, and its conclusions can only be regarded as final when the collection of materials is complete. When the several national collections have reached this stage of representative completeness, a new departure of the science, in the direction, first, of comparative archæology, and secondly, of general archæology, will become possible.

In the meantime, the results of investigations have established, for the greater part of Europe and some parts of Asia, a series of stages of progress of industrial culture, marked by the successive use of stone, bronze, and iron, as materials for the fabrication of cutting tools and weapons. These stages of progress, when applied to a national area like that of Denmark, in which this division of prehistoric culture was first formulated, are spoken of as the Stone Age, the Bronze Age, and the Iron Age of the prehistoric inhabitants of that country. As these terms do not imply absolute divisions of time, and as they cannot be used unless with relation to the condition of a people, it follows that their succession was neither necessarily nor probably synchronous in different areas, and the same has to be inferred of their duration, which cannot be estimated by any known method of science. It has been conjectured that in Denmark the bronze age may have commenced from two to one thousand years B.C., and the iron age at some time close upon the Christian era. It is not at present known what are the definite areas upon the earth's surface, within which the progress of culture has been through these three successive stages. It is known that this succession has not been universal, as many peoples have passed directly from the use of stone to that of iron. An Age of Copper in place of, or in addition to, the age of bronze, has been suggested in some areas of Europe, Asia, and America; and if the observations on which this conclusion rests shall be confirmed by future investigations, the archæological area of the age of copper will be an important element in the development of the science. It is also known that the succession which, in England, France, and some portions of Central and Southern Europe, is distinguished as from the palæolithic to the neolithic division of the stone age, has not been universal; but

it is not known what are the definite boundaries of the area, or areas, within which it occurred; and this also will not be capable of determination until the different national areas have been exhaustively investigated.

Worsaae gives the following approximate chronology of periods for the Scandinavian north: (1) The early Stone Age, at least 3000 B.C. (2) The later Stone Age, about 2000 to 1000 B.C. (3) The early Bronze Age, about 1000 to 500 B.C., when a stone age existed to the north, and an iron age had already come in to the south. (4) The late Bronze Age, about 500 B.C. to the time of Christ's birth, when a pre-Roman age of iron was developed in Central and Western Europe. (5) The early Iron Age, from 1 to 450 A.D., when bronze was still in use in parts of the Scandinavian peninsula. (6) The middle Age of Iron, about 450 to 700 A.D., when foreign Romano-German influence predominated. (7) The later Iron Age, or viking period, about 700 to 1000 A.D., when a stone age still lingered in the extreme north of Finland and Lapland.

The study of archaeology in any given area is thus a study of all the remains of man and his works occurring within that area, with the view of determining their relations to each other in time, and ascertaining their typical relations with corresponding remains in other areas. It includes the history of industry and art, and the development of human culture from its lowest to its highest manifestations; and also the history of civilisation, or the progress of aggregate communities, from the first simple principles of combination for mutual helpfulness, to the highest manifestations of social and political organisation.

Applied to the British area, archaeology reveals that Scotland, like Denmark, Norway, and Sweden, discloses no evidence of its occupation by man in the palæolithic period of the stone age, when the human species was, in certain other areas of Europe, contemporary with a group of extinct animals; these earliest remains being confined to England south of the Humber. But the whole area of England and Scotland presents traces of the cairn-builders of the closing portion of the stone age, who buried their dead in chambered cairns, and possessed the domestic animals still common in these countries. Their urns, or funereal pottery of fire-baked clay, were wide, shallow, round-bottomed vessels, decorated with rectilinear ornamentation, or pitted with the finger-nail. Their weapons were bows and arrows, tipped with well-made triangular or lozenge-shaped points of chipped flint, and axes of different varieties of polished stone. The bronze age is represented by a different set of burial customs, in cairns that are not chambered, the bodies being deposited singly, in cists of slabs, and accompanied by flat-bottomed urns, tall, and tapering to a narrow base, with rectilinear ornamentation encircling the exterior surface in bands. This system of single burial in cists, in place of aggregate burial in the chambers of a cairn, which distinguishes the bronze age sepulchral deposits from those of the stone age in Britain, prevails not only in the unchambered cairns, but in the barrows or artificial mounds of earth, and common cemeteries, or groups of interments in natural mounds and ridges of gravel and sand, as well as in the monumental cemeteries surrounded by circles of standing stones. The customs of cremation and unburnt burial appear to have existed side by side throughout the bronze age; cremation, however, being the more frequent form in the chambered cairns of the age of stone. The implements and weapons of the bronze age were made of an alloy of copper and tin, in the proportion of about nine parts of copper to one of tin, and were cast in moulds of

stone or hardened clay, and their edges hammered fine and planished with a whetstone. They consist of knives of several varieties of form, daggers, swords, spear-heads, shields, axes of three varieties of shape—flat, flanged, and socketed—chisels, gouges, sickles, &c. The personal ornaments were made of bronze, but frequently also of gold, and consisted chiefly of ring-shaped bracelets, necklets, dialems, and earrings. Throughout the bronze age, flint arrow-heads continued to be used; and polished stone ornaments, such as bracers to protect the wrist from the recoil of the bow-string, and beads and necklaces of jet and amber, were common. The iron age introduces a system of curvilinear ornamentation of peculiar character for the surface decoration of objects of personal use and ornament, which still continue to be made of bronze or gold, though silver is now also common; and all the cutting implements and weapons are made of iron. The burial customs of the iron age are not yet disclosed for Scotland; but in the neighbouring area of the north of England, the custom of burial in barrows, without cists of stones or sepulchral urns, but accompanied by horses and chariots and their harness and furniture, is shown to have prevailed. In the early Christian period, when grave-goods ceased to be buried with the dead, the archaeological interest is transferred from the underground phenomena of the burial, to its overground manifestations in monumental symbolism and memorial sculpture. The symbolism appears to have been developed into a system peculiar to the Scottish area; but the art of the memorial sculpture corresponds with that of the illuminated ornamentation of the early Celtic manuscripts of Gospels and Psalters, and with the decorative patterns of such articles of Celtic metal-work, as chalices, croziers, book-covers, and brooches of the same period. After the 12th century, the Celtic style of decorative art gave way to the European styles, introduced by freer contact with continental influences; but the national style exerted a strong influence upon the monuments of the West Highlands and Islands of Scotland until the Reformation, and lingered in the decoration of brooches of brass and silver, the carving of dirk-handles and powder-horns, and the tooling of leather-coverings for targets, till after the Rebellion.

In former days our knowledge of past times was wholly derived from history and tradition. Their remains were regarded as the work of the gods, or assigned conjecturally to some race or order of historic fame, as the stone circles of Britain were given to the Druids, bronze weapons and implements to the Romans or Phœnicians, and the sculptured monuments of Scotland to the Danes. The professed antiquary of the 18th century, bound by the traditions of scholarly research, did little in the way of original investigation; but he unconsciously laid the foundation of the science by his passion for collecting. When the articles were brought together, classification suggested itself, and general deductions became for the first time possible. Thus flint axes and arrow-heads, stone whorls and variegated beads, ceased to be credited with superstitious attributes as thunder-bolts, elf-shot, amulets, and adder-stones, and came to be recognised as materials of science, capable of being utilised for the increase of knowledge. The formation of societies for the promotion of the study was a great step in advance. The Society of Antiquaries of London was incorporated in 1751, and the Scottish Society in 1780. The number of provincial and local societies has increased enormously in recent years, and their publications form an extensive body of archaeological literature. The first systematic researches

among the actual remains of antiquity were made by Rev. Bryan Faussett among the Anglo-Saxon tumuli of the Kentish Downs from 1757 to 1773. He was followed by Rev. James Douglas, who published his *Nenia Britannica, or a History of British Tumuli*, in 1793. Sir Richard Colt Hoare issued an account of his explorations of the tumuli of the Wiltshire Downs in 1820. More recently, the investigations of the tumuli of Derbyshire by Bateman, and of the barrows of Yorkshire and the north of England by Greenwell and Rolleston, have supplied much authentic information of the burial customs of primitive times.

An extraordinary impetus was given in another direction by the announcement in 1847 of the discovery by M. Boucher de Perthes, in the valley of the Somme, of certain rude types of implements of flint in river-gravels inclosing remains of extinct animals. Though at first received with incredulity, these discoveries were afterwards fully verified, and the river-drifts of England, from Salisbury Plain in the south to the Yorkshire Onse in the north, were found to yield the same forms of implements in similar association with remains of such extinct animals as the mammoth and woolly-haired rhinoceros; thus extending the antiquity of man far beyond the period of the tumuli and the surface finds, to which his remains had been hitherto supposed to be confined. Dr Schmerling, in 1833, had published his researches in the caves of Liège, in which he had found flint implements of similar types, also associated with remains of extinct animals; and his discoveries were subsequently confirmed and extended by those of M. Dupont in the caves of Belgium, of Messrs Lartet and Christy in the caves of Dordogne in France, and of Mr Pengelly and Professor Boyd Dawkins in those of England. More recently, similar implements of quartzite have been found by Mr Bruce Foote and others in the laterite beds of Madras, and occasional discoveries of the same nature have been made in Spain, Italy, Greece, and Asia Minor. From the similarity both of the implements and of the associated fauna of the drift and of the caves, they are attributed to the same period, and have been styled *Paleolithic*, or of the older division of the stone age, in contradistinction to the relics of the *Neolithic*, or later division of the stone age. The discovery of the Swiss lake-dwellings in 1854, and their systematic description by Dr Keller, gave another impulse to investigation which extended the area of this phase of primitive life to Italy, Germany, and Austria. Lake-dwellings had been previously known and described by their Celtic name of crannogs in Scotland and Ireland, although their character and contents had been but little investigated. To elucidate the ancient modes of life, the habits and customs of modern savages have been studied, and the results applied to archaeology by Lubbock, Tylor, and Burton. Sociology, or the phenomena and methods of the development of civilisation, have been investigated by Herbert Spencer and Sir Arthur Mitchell. The exploration of historic sites, of which Layard was the pioneer at Nineveh, has been recently continued, with very important results, by Schliemann in Asia Minor and Greece, by Flinders Petrie in Egypt, and by Captain Conder in Palestine and Syria.

There are lectureships of archaeology at Oxford, Cambridge, and Edinburgh, and English and American schools of archaeology have been recently founded at Athens. Nearly all European governments have taken measures for the protection of ancient monuments; and in Denmark, Holland, and France, the government has provided for the purchase of the sites of such monuments from the owners, in order to preserve them as national property. Special pro-

vision has also been made for the ingathering of prehistoric relics to the different museums of national antiquities. The Royal Museum of Old Northern Antiquities at Copenhagen, established in 1816, and classified by Thomsen and Worsaae on the basis of the succession of the three ages now universally adopted, contains a completely representative series of the prehistoric antiquities of Denmark, one of its special features being the remains from the Kjøkkemøddings of the Baltic coast. The National Museum of France at St Germain, near Paris, has for its special feature the extensive collections from the river-drifts and the Dordogne caves. The national museums of Norway and Sweden, on the other hand, exhibit the remains of the iron age as they are nowhere else represented; while the museums of Zürich and Constance are specially rich in the lake-dwelling remains so characteristic of Switzerland. At Rome, the new Archaeological Museum, under the direction of Pigorini, is rapidly filling with the prehistoric remains of Italy; while the Vatican collection is rich in the remains of the Early Christian period. At Naples, the objects disinterred from the buried cities of Herculæum and Pompeii are gathered into a museum of unrivalled interest. At Athens, the discoveries of Schliemann, and the explorations of the Archaeological Society of Greece, have created a national museum of special importance. In Egypt, the museum at Boulak, a suburb of Cairo, contains the results of the explorations of the tombs of the kings of the early dynasties, and an extensive collection of general antiquities from the valley of the Nile. At Washington, the United States National Museum already rivals the largest establishments of the Old World in the extent and variety of its ethnological collections. The British Museum in London, established in 1753, though rich in its general collections, possessed no department of British antiquities till a full century afterwards. The Scottish National Museum, founded by the Society of Antiquaries of Scotland in 1780, and maintained by them till 1856, when it was gifted to the nation and established as a national institution, and the Museum of the Royal Irish Academy at Dublin, both possess fairly representative collections of national antiquities. For American Archaeology, see AMERICA.

The following books of reference on the archaeology of the special areas, or on the special branches of which they treat, may be usefully consulted. GREAT BRITAIN AND IRELAND—Evans, *Stone Implements, Ornaments, &c. of Great Britain and Ireland*; and *Bronze Implements, &c.*; Davis and Thurnam, *Cranial Britain*, 2 vols.; Boyd Dawkins, *Early Man in Britain*. ENGLAND—Greenwell, *British Barrows*; Boyd Dawkins, *Cave-hunting in England*; Kenble, *Howe Fossils*. SCOTLAND—Wilson, *Prehistoric Annals of Scotland*, 2 vols.; Anderson, *Scotland in Early Christian and Pagan Times*, 4 vols.; Stuart, *Sculptured Stones of Scotland*, 2 vols.; Drummond, *Sculptured Monuments of Iona and the West Highlands*; Munro, *Scottish Lake-dwellings*. IRELAND—Wilde, *Catalogue of the Museum of the Royal Irish Academy*; Wood-Martin, *Lake-dwellings of Ireland*. FRANCE—Chantre, *Age du Bronze en France*, 3 vols. 4to, and 1 vol. folio, plates; Lartet and Christy, *Reliquie Aquitaines, or the Archaeology and Ethnology of Southern France and the Caves of Perigord*; and the various works of De Mortillet. BELGIUM—Dupont, *Truys Préhistorique en Belgique*. DENMARK—Worsaae, *Pre-history of the North* (trans. 1887); *Industrial Arts of Denmark from the Earliest Times* (South Kensington Handbook); Madsen, *Afsbildninger af Danske Oldsager*, 3 vols.; Engelhardt, *Denmark in the Early Iron Age*. SWEDEN—Hildebrand, *Industrial Arts of Scandinavia in the Pagan Time* (South Kensington Handbook); Montelius, *La Suède Préhistorique*. NORWAY—Rygh, *Antiquities Norvègiennes*. FINLAND—Aspelin, *Antiquites du Nord Finno-Ougrien*. CENTRAL GERMANY—Lindenschmidt, *Altgermanischer Heidnischen Vorzeit*, 3 vols. SWITZERLAND—Keller,

Lake-dwellings of Switzerland. AMERICA—Rau, *Archæological Collections of the United States National Museum, Washington*; Nadaillac, *Prehistoric America*. GENERAL ARCHÆOLOGY—Lubbock, *Prehistoric Times*; Wilson, *Prehistoric Man*, 2 vols.; Stevens, *Flint Chips*; *Matériaux pour l'Histoire de l'Homme*, 29 vols.; Reports of the International Congresses of Archæology held at Paris 1867, Ipswich 1868, Copenhagen 1869, Bologna 1871, Brussels 1872, Stockholm 1874, Buda-Pesth 1876, and Lisbon 1880.

Amongst the numerous archæological articles in this work are the following :

Armour.	Coffin.	Piets' Houses.
Avebury.	Cromlech.	Pottery.
Barrows.	Dolmen.	Round Towers.
Beehive Construction.	Earth-houses.	Sculptured Stones.
Brochs.	Flint Implements.	Standing Stones.
Bronze Age.	Glass.	Stone Age.
Burial.	Iron Age.	Stone Circles.
Cairn.	Kent's Cavern.	Stonehenge.
Caves.	Kitchen Middens.	Teocalli.
Celt.	Lake-dwellings.	Urn.
	Man (Antiquity of).	Vitrified Forts.

Archæop'teryx, an extinct bird, the remains of which have been obtained in the well-known Solenhofen lithographic stone—a limestone of Jurassic age—which is quarried at Aichstadt in Bavaria. Only two specimens of the archæopteryx are known—one in the British Museum, and the other at Berlin. The bird appears to have been about the size of a rook. It was at first believed to be a reptile, then a transition form between reptiles and birds, but Professor Owen showed that it was a true bird. The anomalous structure which led the first observers astray was the tail, which, instead of consisting of a few shortened vertebrae united together into a coccygean bone, as in all



Remains of Archæopteryx in Solenhofen Stone.

known birds, recent or fossil, was formed of twenty elongated vertebrae, each of which supported a pair of quill-feathers. The metacarpal bones were not ankylosed, as in all known birds, from which it also differed in having two free claws, belonging to the wing. The long lizard-like tail is not so anomalous as it at first sight appears, for in the early embryonic condition of the bird, the vertebrae are distinct and separate, and the anastomosis

which invariably takes place in the subsequent development of the embryo does not occur in the archæopteryx, so that it may be considered to exhibit the temporary embryonic condition of the bird as a permanent structure; and that this is the true position of this singular fossil is further established by the existence of other features which are found only in birds. These are the ornithic structure of the wings and legs, the occurrence of feathers, which are confined to birds, and the existence of a merry-thought (furculum), which is found in no other class of animals. An elevation on the surface of the slab containing the fossil is believed by many to be the cast of the interior of the skull, and it corresponds remarkably in size and form with the cast from the skull of a rook. It is probable that the jaws were furnished with teeth sunk in sockets, like the toothed birds of cretaceous times.

Archangel, the chief city in the Russian government of Archangel, is situated about 40 miles above the junction of the river Dwina with the White Sea. It is the seat of an archbishop, and owes its name to the monastery of St Michael. Archangel is the chief commercial city for the north of Russia and Siberia, and is visited by numerous vessels—especially British—from June to October, the port being clear of ice only during that period. The harbour is about a mile below the town, at the island of Solombaly; and 12 miles below there is a government dockyard and merchants' warehouses. The houses are built chiefly of wood. The finest edifices are the bazaar or mart (1668-84), and the marine hospital. Archangel has an ecclesiastical college, one Protestant and twelve Greek churches, schools for engineering and navigation, a gymnasium, a naval hospital, government bank, &c. The chief articles of traffic are fish, flax, oats, linseed, tar, pitch, rosin, train-oil, skins, furs, timber, wax, iron, tallow, bristles, caviare. The manufactures include cordage, canvas, linen, leather, beer, and sugar. It is connected by river and canal with a great part of European Russia. The town, which is the oldest seaport in the empire, dates its rise from a visit paid by the English seaman, Chancellor, in 1553; an English factory was soon afterwards erected, and a fort was built in 1584. When Peter the Great visited Archangel in 1693-94, the town was in the height of its prosperity, but his later policy after the founding of St Petersburg caused the town to decline. Since receiving the same privileges as the latter town, in 1762, Archangel has increased in prosperity. Pop. (1880) 19,540. The government of Archangel has an area of 331,505 sq. m., and had in 1883 a population of 318,429. The population, formerly Finnish, is now chiefly Russian. The land lying within the arctic circle is desolate and sterile, and the people support themselves chiefly by the chase. Southward, immense forests constitute the chief wealth of the country. Gold, naphtha, and salt are found in various parts.

Archangel. See ANGEL.

Archangel, a name sometimes applied to *Lambium purpureum* and *L. Galcedolon*. See DEADNETTLE, but cf. also ANGELICA.

Archbishop (Gr. *arch*, and *episcopos*, 'over-seer') is the title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province, and also exercises episcopal authority in his own diocese. Occasionally, however, the title has been bestowed upon a prelate of a famous city, without his being made a metropolitan and having suffragans under him. The title arose, in the 3d and 4th centuries, from the provincial synods being held once or twice a year in

the chief town of the province under the presidency of the bishop of the place. Another cause of the origin of the title is said to be the custom of planting new bishoprics as Christianity spread, a slight supremacy being still retained by the original chief pastor over those newly appointed. In the Oriental Church, the archbishops are still called 'metropolitans,' from the circumstance first mentioned. In the African Church, on the other hand, the term used was 'primus.' The great archbishoprics of the early Church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the 6th century, the Archbishop of Rome has claimed exclusively the name of Pope (*papa*), which early fathers—e.g. St Jerome—apply to all bishops, and occasionally even to presbyters. There is an official letter by Justinian, addressed to 'John, Archbishop of Rome and Patriarch;' and several ecclesiastical constitutions are addressed to 'Epiphanius, Archbishop of Constantinople and Patriarch.' The synod of Antioch, in 341, assigned to the archbishop the superintendence over all the bishoprics, and a precedence in rank over all the bishops of the church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose, out of this superiority of rank, privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the Patriarchs (q.v.) towards the end of the 4th and during the 5th century, and still more to the pope in the 9th. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honour of having the cross carried before them in their own archiepiscopate, even in presence of the pope himself, and of wearing the *pallium*.

In England there are two archbishops, of whom the one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though as ruling over a province in place of a single diocese, both have enjoyed the rank of metropolitans from the first, the Archbishop of Canterbury has all along enjoyed, not merely precedence as the successor of Augustine and the senior archbishop, but the possession of a pre-eminent and universal authority over the whole kingdom. This pre-eminence is marked in the titles which they respectively assume—the Archbishop of Canterbury being styled the Primate of all England (*metropolitans et primas totius Angliæ*), whilst the Archbishop of York is simply called Primate of England (*primas et metropolitans Angliæ*). It is also indicated by the places which they occupy in processions—the Archbishop of Canterbury, who has precedence of all the nobility (excepting those of the blood royal), not only preceding the Archbishop of York, but the Lord Chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland, the authority of the Archbishop of Canterbury extended to that island. The amount of control which belongs to an archbishop over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese, or is guilty of immorality, the archbishop may call him to account, and even deprive him. In 1822 the Archbishop of Armagh, who is primate of all Ireland, deposed the Bishop

of Clogher on the latter ground. Writers, however, who maintain the *jus divinum* of bishops over presbyters, do not claim more than a *jus humanum* for a metropolitan over his suffragans; and assert that, though a bishop may overrule a decision made by a majority of his clergy, an archbishop is bound to give way to a majority of the bishops of his province. To the Archbishop of Canterbury belongs the honour of placing the crown on the sovereign's head at his coronation; and the Archbishop of York claims the like privilege in the case of the queen-consort, whose perpetual chaplain he is. The province of the Archbishop of York, consisting of the six northern counties and Cheshire, includes nine dioceses. The rest of England, with Wales, forms the province of the Archbishop of Canterbury, and includes 24 dioceses. The dioceses of the two archbishops—i.e. the districts in which they exercise ordinary episcopal functions—were remodelled in 1836. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called 'peculiars;' with small districts in other dioceses, particularly London. The diocese of the Archbishop of York embraces the county of York, except that portion of it now included in the dioceses of Ripon and Manchester, and some other detached districts. The election of an archbishop does not differ from that of a Bishop (q.v.); nor is the form of consecration essentially different, excepting that the oath of obedience to the archbishop is necessarily omitted. He also writes himself 'by Divine Providence;' a bishop being 'by Divine Permission;' and has the title of 'Grace,' and 'Most Reverend Father in God,' whilst a bishop is styled 'Lord,' and 'Right Reverend Father in God.' The archbishop is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled up within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the archbishop of the next avoidance of one such dignity or benefice belonging to his see as the archbishop shall choose.

In England there is but one Roman Catholic archiepiscopal see, that of Westminster; in Scotland there are two, St Andrews and Edinburgh, and Glasgow. In Ireland there are two Protestant and four Roman Catholic archbishops. Of the former, the Archbishop of Armagh is primate of all Ireland; the Archbishop of Dublin being primate of Ireland. They formerly sat alternately in the House of Lords; the three bishops who along with them represented the Church of Ireland being chosen by rotation.

The United States are divided by the Roman Catholic church into twelve ecclesiastical provinces, each under an archbishop, and each including several dioceses. The divisions are known as the provinces of Baltimore, Boston, Chicago, Cincinnati, Milwaukee, New Orleans, New York, Oregon, Philadelphia, St Louis, San Francisco, and Santa Fé. There are no Protestant archbishops.

Archdeacon, an ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The archdeacon originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church, and directing the deacons in their duties. From being thus mere assistants, archdeacons in the 5th century began to share the bishop's powers, and step by step attained to an authority in many respects distinct from that of the bishop, and claimed a jurisdiction proper to themselves, and the right to appoint their own subordinates. Several synods protested

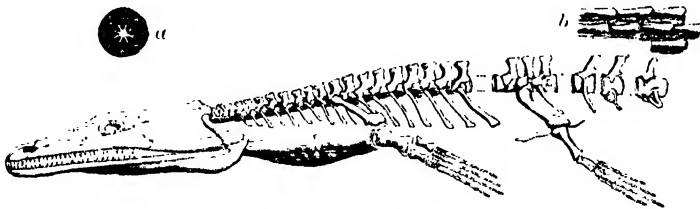
against the innovation, and in the 13th century their powers were limited by the establishment of episcopal courts. Their dignity and influence is now very much reduced in the Catholic Church. There was formerly one archdeacon for each diocese in England, but the act following the report of the Ecclesiastical Commissioners in 1836, has made two the minimum number, and in some dioceses there are four. No person can be appointed an archdeacon till he has been six years complete in priest's orders. The duty of parochial visitation has long been regarded as belonging specially to this office, and it was by its exercise mainly that the archdeacons attained to the dignity of ordinary instead of delegated jurisdiction. Even in performing this function, however, and in holding general synods or visitations, ordering repairs of churches, and the like, the archdeacon is properly to be regarded as being what the canon law called him, 'the bishop's eye.' The archdeacon is *ex officio* a member of Convocation (q.v.), and in his court hears from the churchwardens any representations of public scandal. The judge of the archdeacon's court, when he does not preside, is called 'the official.' There is an appeal to the Court of the Bishop, or in the case of an archdeacon of an archbishopric, to the Court of Arches. See DEACON, DEANS, PRIEST.

Archduke (Ger. *Erzherzog*). Archduke and archduchess are titles now borne by all the sons and daughters of an emperor of Austria, and by their descendants through the male line. The title of archduke was gradually assumed, since 1359, by the Dukes of Austria, as a mark of precedence over the other dukes of the empire, and was formally conferred on them by the Emperor Frederick III. in 1453, who himself, as duke, was the first recipient of the imperial gift.

Archegoniata. See CRYPTOGRAMIC PLANTS.

Archegonium. See CRYPTOGRAMIC PLANTS, FERN, &c.

Archegosaurus, a remarkable fossil saurian reptile. It had four long, slender digits, which obviously supported a longish narrow-pointed paddle,



Archegosaurus: *a*, section of a tooth; *b*, scales.

adapted for swimming. Externally, the body was protected by a covering of oblong quadrangular scales, which are preserved in some specimens.

Several species have been described. Goldfuss considered them to be a transition state between the fish-like batrachia and the lizards and crocodiles. Professor Owen has subsequently described this fossil; he makes it a remarkable connecting link between the reptile and the fish, and on these grounds: It is related to the salamandroid-ganoid fishes by the conformity of pattern in the plates of the external cranial skeleton, and by the persistence of the *chorda dorsalis*, as in the sturgeon, while it is allied to the reptiles by the persistence of the *chorda dorsalis* and the branchial arches, and by the absence of the occipital condyle or condyles as in *Lepidosiren*, and by the presence of labyrinthine teeth as in *Labyrinthodon*, which, however, also ally it to the ganoid *Lepidosteus*.

There is thus in the *archegosaurus* a blending together of the characteristics of reptile and fish in one animal. It occupies a position between, and equally related to, the salamandroid-ganoid fishes on the one hand and the labyrinthodont reptiles on the other, while the latter conduct us through the *Lepidosiren* to the perennibranchiate batrachia.

Archelaus, (1) one of the Heraclidae, the mythical founder of the royal house of Macedonia.—(2) A philosopher of the Ionic school, born at Athens, or, according to others, at Miletus. He was a scholar of Anaxagoras, and flourished about 450 B.C. He was the first to maintain the spherical form of the earth, which he inferred from his observation that the sun does not rise and set simultaneously at all parts of the earth, as must be the case were it a flat surface.—(3) King of Macedonia, a natural son of Perdiccas II., obtained the throne by murdering the rightful heir in 413 B.C. His reign was far better than its commencement, as he introduced several salutary measures, and was a generous patron of art and literature. His palace was splendidly adorned with paintings by Zeuxis, and Euripides was among his guests. He is believed to have been murdered by his favourite, Craterus, in 399.—(4) A distinguished general under Mithridates the Great, sent to Greece with a fleet and a large army to oppose the Romans in 87 B.C. He was defeated by Sulla at Charonea, and a second time, with immense loss, at Orchomenos, in Boeotia, in 86. Unjustly suspected of treason, Archelaus went over to the Romans at the outbreak of the second war in 81.—(5) The son of the preceding, married Berenice, daughter of King Ptolemy Auletes, in 56 B.C., and ruled over Egypt for the short space of six months during the banishment of Ptolemy.—(6) Ethnarch of Judaea, son of Herod the Great, succeeded his father in 1 A.D., and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, Archelaus went to Rome, where his authority was confirmed by Augustus, who made him Ethnarch of Judaea, Samaria, and Idumaea, while his brothers, Antipas and Philip, were made tetrarchs over the other half of the dominions of Herod. After a reign of nine years, he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienne, in Gaul, where he died. His territories were added to the Roman province of Syria.

Archenholz. JOHANN WILHELM VON, born at Danzig in 1745, served in the army, passed ten years in England (1769-79), and died near Hamburg in 1812. His *Geschichte des siebenjährigen Kriegs* (1793) reached an eleventh edition in 1879. He also wrote *England und Italien* (1785); *Annalen der Britischen Geschichte* (20 vols. 1789-98); biographies of Queen Elizabeth and Gustavus Vasa, &c.

Archer Fish, a name given to certain small East Indian fishes of the Acanthopterygious family of Squamipennes or Characodontidae, which have acquired the unique habit of catching insects by spouting water from their mouths. The drops of water are surely aimed, and enveloping the desired insect, cause it to fall into the water, where it is instantly seized as prey. *Toxotes jaculator*, one of these species, is a fish about 6 or 7 inches in length, a native of Java and other parts of the Indian Archipelago, and is that to which the name archer fish has been more strictly appropriated. It can

project a drop of water to the height of 4 or 5 feet. *Chelmon rostratus*, also a Javanese fish, possesses the same power, and the Chinese in Java keep it in



Archer Fish (*Toxotes jaculator*).

jars for their amusement, causing it to practise its art by placing insects within its range.

Archery is the art of shooting with the bow and arrow. The use of these weapons was probably known to man at a very early period of his history, and triangular flint arrow heads, chipped into the requisite shape, are found in all parts of the world, showing that they must have been known and largely used at a period anterior to the discovery of the working of metals. The bow is mentioned in Scripture as having been used in patriarchal times, and we know that all the leading nations of antiquity were acquainted with it. Assyrian sculpture and Egyptian hieroglyphics testify to its use among these peoples, and the Thracians, Cretans, Parthians, and Numidians were held in high estimation as archers. Homer frequently mentions bows; that of Pandarus was made of a goat's horns 'joined and shaped' 'with artful toil,' and tipped with gold. The poet alludes to it as being used, not only as a weapon of war, but in the sports of the arena, and describes a contest at what would now be called 'shooting at a popinjay' or bird fastened to the top of a mast. The Romans, too, did not disdain the use of the bow in warfare, though it probably did not form part of the arms of the regular legions, but was confined to the auxiliary troops. Procopius mentions that in Justinian's African campaign, the cavalry were clad in coats of mail, and were armed with swords and bows and arrows. The emperors themselves occasionally displayed their skill with the bow, and we are told that Gratian, Commodus, and Domitian were all accomplished archers. Asia, however, and not Europe, must be considered the home of the bow, and almost all the oriental nations have excelled in its use. The practice of archery is still a favourite sport among the Tartars, Chinese, and Persians; while the Scythians gave their name to a peculiar shape of bow like a crescent moon, which was at one time extremely popular in the East. But no one country or continent can lay claim to the bow as exclusively its own: wherever man is found, he is almost certain to have taken with him his bows and arrows. They are used within the frigid regions of the north, as well as under the burning tropical sun. The Hottentots, Bushmen, South Sea Islanders and the Indians of South America, and a few still in North America, are expert in the use of the bow. As a part of military warfare, however, archery was never brought to greater perfection than it was in

England in the time of Edward III. That monarch devoted much attention to the encouragement of the art among his people, and the consequence was that English bowmen were the foremost in the world; and their prowess was amply proved by the large share they contributed to the successes of Cressy, Poitiers, Agincourt, and other battles. The English archers were all armed with the long-bow, while the French principally depended on the arbalest or crossbow, a powerful, but clumsy and unwieldy weapon. Archers continued to form a part of the English army long after the introduction of gunpowder; in 1572 Queen Elizabeth promised to place at the disposal of Charles X. six thousand men, of whom the half were archers. Archery decayed as firearms came into use. Charles I. endeavoured to revivify the art; and at the breaking out of the civil war, an attempt was made to raise a regiment of archers for the service of the King. Highlanders armed with bows, arrows, and quivers, were in the Covenanters' army at Duns Law in 1639. Cossacks similarly armed entered Paris in 1814.

In Scotland, archery never took such deep root as in the sister country, notwithstanding frequent statutory enactments regarding it. Doubtless owing to legislative encouragement, archery was, however, practised with some success throughout the country; but the people did not seem to take to it as they did in England, and Scottish archers never distinguished themselves on a field of battle.

Bows have assumed various forms in different countries, and have been made of several substances. The bows used in England were at first what are called *self bows*—i.e. made of one piece of wood, generally yew, throughout. Yew, however, being often difficult to procure, *backed bows* were introduced formed of two pieces of wood glued and pressed firmly together; and at the present time bowyers largely make *three-wood bows*, a method which is found to give additional pliancy and strength to the weapon. The weight of bows varies according to the requirements of the archer. A lady's bow may be bent with a pull not exceeding 28 or 30 lb., while a man may use one of double that strength. On an average, however, it will be found that a bow of about 42 lb. is most suited to ranges up to a hundred yards, while for greater distances one of between 50 and 60 lb. may be employed.

The manner of shooting with the bow has varied in different periods and peoples. In ancient times, it seems to be certain that the bow was pulled towards the breast, but it was latterly discovered that by drawing it towards the chin or right ear, much greater force was obtained. Of the different modes of quitting the arrow, an elaborate monograph has been written by an American author, Mr Morse. What he designates severally as the 'primary,' 'secondary,' and 'tertiary' release, have all the same inherent fault—viz. that the arrow is held between the finger and thumb while being quitted. This form of release is still practised by some of the North American Indian tribes. The 'Mediterranean loose,' as practised for ages by nations north and south of that sea, is the best practical mode of releasing the arrow. In it the bow-string is drawn back with one, two, or three fingers, or with one and two only, the balls of the fingers clinging to the string, the terminal joints slightly flexed, the arrow kept in its place between the first and second fingers; the thumb straight, taking no part in the release. This method of quitting is found to be practised in regions as far apart as Siberia and the Andaman Islands. Assyrian sculptures show both the primary and the Mediterranean release, but it is probable that the latter was introduced only after the 9th century B.C. It

is supposed, however, to have been known to the Egyptians long before that date.

There is no doubt that early training and constant practice conduce to a wonderful degree of accuracy in the art of shooting with the bow, but the record of many feats of the kind must be taken with a considerable amount of caution; the amount of exaggeration contained in many such narratives has probably given rise to the proverbial phrase, 'drawing the longbow.' As a general rule, it may be held that at a greater distance than a hundred yards, great accuracy of aim is not attained, though marks may occasionally be hit at double that distance. Longer and lighter arrows are used for shooting at the greater distances; for butt shooting they are shorter, heavier, and blunter in the point. It was the boast of the English archers of the olden time that every man pulled a 'cloth yard shaft.' Such an arrow, however, would be too heavy for very long distance shooting. One of the longest recorded shots in modern days was made with a very light arrow of about 25 inches length, by the secretary to the Turkish embassy in London, in 1794. He shot against the wind 415 yards, and back again with the wind 463 yards. This, of course, was a mere trial of distance shooting, and did not profess to be aimed at any particular mark.

The old English arrow was made of ash, weighed from 20 to 24 pennyweights, and was tipped with steel and feathered with goose feathers. South Sea Islanders show great ingenuity in tipping and barbing their arrows with fish bones and teeth. In South America the arrow heads are steeped in a strong vegetable poison called *ourari* or *woorali*, the basis of which is the juice of *Steghanos toxicaria*, and which has fatal results in a surprisingly short time. The Bushman employs serpent poison and euphorbia juice. Putrid flesh is said to be used in some South Sea Islands, the poisonous effect of which is more frequently painful than fatal.

The ordinary mode of practising archery as a pastime, with most of the clubs in England, is shooting at targets placed at distances varying from 50 to 100 yards apart. The targets are 4 feet in diameter, and have a gold spot in the centre surrounded by rings coloured red, blue, black, and white with a border of green. Each of these rings possesses a different value, every hit in the gold being counted nine, in the red seven, in the blue five, in the black three, and in the white one. Whoever gets most value in hits wins the match. Another method of shooting is practised by some clubs, especially by the Royal Company of Archers in Scotland; in this, the targets are placed 180, or even 200 yards apart, and are only 3 feet across, or even less. The arrows used are lighter and longer than in ordinary target shooting, and every arrow hitting the target on whatever part, or 'making a *clout*,' as it is termed, scores two. Should no arrow hit, the nearest within four bows' lengths counts one.

There are a large number of clubs and societies formed for the practice of archery throughout Great Britain. Of these, the oldest is, curiously enough, a Scottish society—the Royal Company of Archers—who constitute the sovereign's Body-guard for Scotland. Their records extend back to 1676, and there are traces of an earlier existence. Almost every notable Scottish family has been at some time or other represented in its ranks. Its affairs are directed by a council, but there are a large body of field-officers; the captain-general—who is always a nobleman of high rank—being Gold Stick for Scotland, the corresponding Gold Stick in England being held by the colonel of the Life Guards. In terms of a charter granted the Royal Company in 1703 by Queen Anne, they perform a service of presenting three barbed arrows to

the sovereign when residing at Holyrood. Queen Victoria had this *reddendo* presented three times. There are many ancient prizes competed for in the Royal Company, including one of the value of £20 annually presented by the Queen.

The oldest existing society of archers in England, if we except the Honourable Artillery Company of London (which was originally a body of archers incorporated by Henry VIII.), is the Royal Toxophilite Society, founded by Sir Ashton Lever in 1780. The Woodmen of Arden is another old society, having been founded five years later. There are about a hundred archery clubs throughout the kingdom. See Ford's *Theory and Practice of Archery* (new ed. by Butt, 1887). Ascham's *Toxophilus* (1545) is a monument of English, and a sound treatise on archery in his day.

Arches, COURT OF, a court belonging to the Archbishop of Canterbury, anciently held in the church of St Mary-le-Bow (*S. Maria de Arcubus*) in London. The presiding judge is called the Dean of Arches. His office has long been united with that of the archbishop's principal official; and the Public Worship Regulation Act of 1874 provided that the same judge should also become the principal official of the Chancery Court of York. See ECCLESIASTICAL COURTS.

Archil, or ORCHIL (Fr. *orseille*; Span. *archilla*, Ital. *orceillo*), is a colouring substance obtained from various species of lichens. The archil is not originally present in the lichens, but is developed during a process of putrefaction and fermentation. The lichens, collected from rocks near the sea, are cleaned, ground into a paste with water, placed in tanks, and ammoniacal liquids—such as purified gas liquor or stale urine—added; when, by the combined influence of the ammonia, air, water, and the constituents of the lichens, a violet-coloured matter is generated, which appears for a time to dissolve in the water, but finally falls to the bottom of the vat in the condition of a moist powder or paste. The latter is then mixed with some substance like chalk or stucco, to give it consistency. Archil is soluble in water and in alcohol, to either of which it imparts a violet colour with a good deal of a crimson hue. It contains orcein, which can be obtained as an amorphous red powder, and to which it owes its tinctorial power. It is much employed in the dyeing of silks; but though a brilliant lilac hue is imparted to the fabric, the colour is not a permanent one, being easily acted upon by the rays of the sun. Hence the cloth is first dyed lilac by another colouring matter, and is then passed through an archil dye, which imparts its brilliant hue. Archil is seldom employed to dye cottons, but it is often used, along with indigo, in the dyeing of woollen cloth. Cudbear (q.v.) and Litmus (q.v.) are analogous to archil, and are obtained from the same lichens. The lichens which yield the best archil in largest quantity are *Rocella tinctoria* and *fuciformis*. The former is called the *Archil* plant; it grows very sparingly on the south coast of England, but is obtained in large amount from the Canaries and Cape de Verd Islands, and from the Levant. It is of a substance between cartilaginous and leathery, roundish, pretty erect, branching in a dichotomous manner, of a grayish-brown colour, with powdery warts (*soredia*)—the *apothecia* (see LICHENS), orbicular, flat, horny, almost black. That from the Canary Isles is generally regarded as the best. It seldom exceeds the thickness of a pin, and is about an inch and a half in length. *R. fuciformis* now yields perhaps more of the Archil or Orchella weed of commerce than *R. tinctoria*. It differs from *R. tinctoria* chiefly in being not rounded, but flat, and in having the *apothecia* very distinctly

bordered. It grows in similar situations, and is also a native of Britain, but is abundant only in warmer climates, as on the coasts of Africa, Madagascar, &c.

Archilochus OF PAROS flourished about 714-676 B.C., and is regarded as the first of the Greek lyric poets, although the origin of the elegy is claimed for Callinus. Glimpses of his life, especially of the calamities which befell him, were frequently given in his writings. His father's name was Telesicles, his mother was a slave called Euipo. At an early age, becoming entangled in political contests, he abandoned his native place, and led a colony of the citizens to Thasos. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians. Subsequently he was banished from Sparta, to which he had gone, either for his personal cowardice or because of the licentiousness of his verses. Having returned to Paros, he took part in the war which broke out betwixt it and Naxos, in the course of which he lost his life. The Delphian oracle pronounced a curse upon his slayer. He was distinguished for the rich variety and vigour of his lyrics. But the most noted characteristic was his satirical bitterness, inasmuch that 'Archilochian bitterness' and 'Parian verse' became proverbial. He scourged his enemies in the most merciless fashion. It is said that Lyncambes, who had promised his daughter Neobule in marriage to Archilochus, having failed to fulfil the promise, was so severely satirised by the poet, that to escape ridicule both father and daughter hanged themselves. Among the ancients, Archilochus was ranked with Homer, Pindar, and Sophocles. Even Plato calls him 'the very wise.' Horace, who largely imitated him in his metres, says that 'rage armed Archilochus with his own iambus'—thus emphasising the fact that to Archilochus we owe the application of iambic verse to satire. One of the forms he often used was called after him *Archilochian verse*. He also used trochee verse, and many of his poems were hymns, elegies, and epodes. The best editions of his fragments are those of Schneidewin and Bergk.

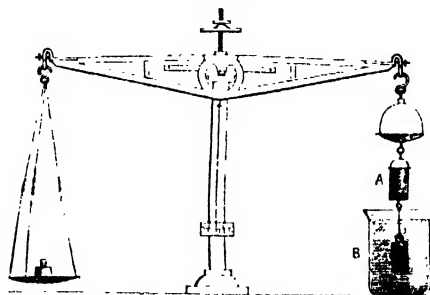
Archimandrite (Gr. *archi*, 'chief,' and *mandra*, 'a fold' or 'a convent'), the title of the highest order of superiors of convents in the Greek Church. See ABBOT.

Archimedes, the most celebrated of ancient mathematicians, was born at Syracuse about 287 B.C. He is said to have been a kinsman of King Hiero, though he seems to have held no public office, but to have devoted himself entirely to science. In regard to mathematics, we cannot estimate fully the merits of Archimedes without an exacter knowledge of the state of the science as he found it; we know, however, that he enriched it with discoveries of the highest importance, on which modern mathematicians have founded their methods of measuring curved surfaces and solids. Euclid considers only a few curved figures in relation one to another, but without comparing them with rectilinear surfaces and solids. The theorems necessary to this transition are laid down by Archimedes in his treatises 'on the Sphere and Cylinder,' 'on Spheroids and Conoids,' and 'on the Measurement of the Circle.' His demonstration that the area of a segment of a parabola is two-thirds of the inclosing parallelogram, is the first real example of the (Quadrature (q.v.) of a curvilinear space. In his treatise on spirals, he rises to yet higher investigations, which, however, are not very easily understood, even by masters of the subject.

Archimedes is the only one of the ancients that contributed anything of real value to the theory of

mechanics and to hydrostatics. He first established the truth that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. It was by this law that he determined how much alloy the goldsmith, whom Hiero had commissioned to make a crown of pure gold, had fraudulently mixed with the metal. The solution of the problem suggested itself to him as he was entering the bath, and he is reported to have been so overjoyed as to run home naked, exclaiming: 'Eureka! Eureka!' (I have found it! I have found it!) His boast, that if he had a fulcrum or stand-point, he could move the world, betrays the enthusiasm with which the extraordinary effects of his newly invented machines inspired him. Among the numerous inventions ascribed to him is that of the endless screw, and the Archimedes Screw (q.v.). During the siege of Syracuse by the Romans, he exerted all his ingenuity in the defence of the city. Polybius, Livy, and Plutarch speak with astonishment of the machines with which he opposed the attacks of the enemy. The improbable story of his having set fire to the ships by means of mirrors, rests on later narratives. When the Romans took the city by surprise (212 B.C.), Archimedes, according to the tradition, was sitting in the public square lost in thought, with all sorts of geometrical figures before him drawn in the sand. As a Roman soldier rushed upon him, he called out to him not to spoil the circle! But the rude warrior cut him down. According to his own direction, a cylinder inclosing a sphere was engraved upon his tombstone, in commemoration of his discovery of the relation between these solids—a discovery on which he set particular value. When Cicero was in Sicily as quaestor (75 B.C.), he found the tomb hid among briars. His extant works, written in Doric Greek, were edited by Torelli (Oxf. 1792), and Heiberg, with a Latin translation (3 vols. Leip. 1880-81).

Archimedes, THE PRINCIPLE OF, is one of the most important in the science of Hydrostatics, and is so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body when immersed in a fluid weighs less than it does in vacuo by the weight of the fluid it displaces; or, A fluid sustains as much of the weight of a body immersed in it as is equal to the weight of the fluid displaced by it (see HYDROSTATICS). It is proved experimentally in the following way: A delicate balance is so arranged that two brass cylinders, A and B, may be suspended from one of the scale-pans, the one



under the other. The lower cylinder, B, is solid, or closed all round, and fits accurately into the upper cylinder, A, which is hollow. When the two cylinders are placed under the one scale, pan-weights are placed upon the other until perfect equilibrium is obtained. The cylinder B is now immersed in water, and, in consequence, the equilibrium is destroyed; but it may be completely restored by filling the hollow cylinder, A, with

water. The amount of weight which B has lost by being placed in the water, is thus found to be exactly the same as the weight of a quantity of water equal to its own bulk, or which is the same thing, to the quantity of water displaced by it. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves, they swim on the surface, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own bulk, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same weight as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. The pretty scientific toy called the Cartesian Diver is intended to illustrate this. Although the principle of Archimedes is generally established with reference to water, its application extends equally to bodies immersed in air or any other fluid.

Archimedes' Screw (called also the *spiral pump*), a machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Fig. 1 represents it in its simplest form. This consists

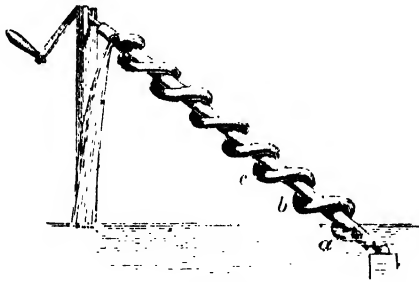


Fig. 1.

of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. In the position represented in the figure, the lowest bend, *a*, of the tube will be filled with water, and if now the handle be made to turn, as seen in the diagram, in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend, *b*. The first bend, *a*, has meanwhile received a second charge, which, after a second revolution, flows into the second bend, *b*, and takes the place of the first charge, which has now moved into the third bend, *c*. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution, the lowest bend will be charged, and the highest discharged. It will be seen from the figure that there is room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines, the cylinder itself is

hollowed out into a double or triple-threaded screw, and inclosed in a water-tight case, which turns round with it, the space between the threads supplying the place of such tubes as are seen in fig. 1. Fig. 2 represents a double-threaded Archimedes screw of this description, with the case removed in front. It is sometimes found

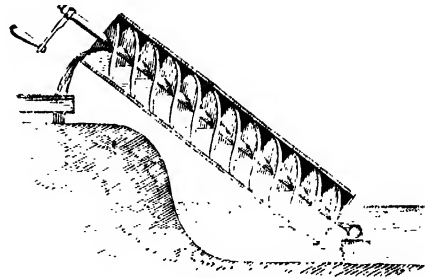


Fig. 2.

convenient to fix the exterior envelope, and to make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact. This modification of the Archimedes screw receives the name of water-screw, and frequently of Dutch screw, from its being extensively used in Holland for draining low grounds.

Archipelago, an Italian form, dating from the 13th century, of the Gr. *Archipelagos*, 'the chief sea,' and the term applied originally to that part of the Mediterranean which separates Greece from Asia (the *Egean Sea* of the ancients); but now extended to any sea, like it, thickly interspersed with islands, or rather to the group of islands themselves. All archipelagoes fall naturally into two groups, the oceanic and the continental. The latter either lie close to the mainland, or are so dotted about the sea as to join, like stepping-stones, two continents. Such are the Chiloe, Patagonian, Arctic, and other groups. The oceanic archipelagoes stand alone, and include the East and West India groups, the Marquesas, and the Sandwich and Friendly Islands. These, as well as Nova Zembla, Spitzbergen, Franz-Josef Land, and any others loosely called archipelagoes, will receive separate notice in their places. The islands in the Greek Archipelago consist principally of two groups, called Cyclades and Sporades; the first from their *encircling* the sacred island of Delos, the second from their being *scattered* in a wavy line. The former lie to the east of Southern Greece, while the latter skirt the west of Asia Minor. The numerous islands which stud this sea range in size from the merest barren rocks to Crete, with an area of 3326 sq. m. Most are of volcanic origin, with high bluffs rising abruptly from the sea. Many are very fertile, producing wheat, silk, cotton, wine, honey, figs, oranges, raisins, and other fruits. The people of the Sporades are employed in fishing for sponge and coral. The climate is healthy, the men are hardy, and the women noted for their beauty, of a pure Greek type. Of the Cyclades, all belonging to Greece, the principal are: Syra, Delos, Tenos, Andros, Cythnos, Thera, Naxos, Melos, and Paros. The chief islands of the Sporades are: Carpathos, Rhodes, Cos, Patmos, Icaria, Samos, Chios, Lesbos, Lemnos, Imbros, Samothrace, and Psyra. These all belong to Turkey and constitute a separate vilayet of the empire, except Samos, which is autonomous, and tributary only; but the following, off Euboea (Negropont), and many smaller islands, belong to Greece: Scyros, Icos, Scopelos, and

Sciathos. Of both groups, the more considerable islands will be noticed, under the alphabetical arrangement, in their respective places.

Architecture is the art of building or constructing. In this country, architecture is usually divided into Civil, Military, and Naval. In the present article we shall confine ourselves to the first, the two others being treated of, the former under the head of **FORTIFICATION**, the latter under that of **SHIPBUILDING**.

The construction of bridges, and especially stone bridges, piers, quays, &c., is just as much a department of architecture as of civil engineering, though in modern times the principle of division of labour has been introduced, and this department has been assigned to the engineer.

Civil Architecture has a scientific or constructive side, and an æsthetic or artistic side. The first relates to the strength, the safety, the convenience, and the comfort of a building, as well as to the nature of the materials used in its construction. The second relates not only to the forms and proportions of its principal features, but to its decorative character, produced by such details as columns, mouldings, tracery, carving, applied sculpture, and inlaying, which in all good architecture are founded on the constructive elements.

The constructive part of architecture, including masonry, carpentry, ironwork, and minor matters, is dealt with under **BUILDING**. Rude stone monuments are such as consist of separate stones or remains of very rude construction. Dolmens, cromlechs, stone circles, and the Scottish brochs are examples of these, and are treated under their several heads. Every nation which has risen above the condition of the savage has adopted some special mode of building suitable to its wants, its climate, and its customs. This is invariably accompanied with a certain style of decoration, arising from the peculiar genius and surroundings of each people. Such styles are usually very persistent in each race, and are handed down traditionally from age to age, and carried from one country to another. Thus the ancient monuments of a country generally serve as a sure index of the people who inhabited it at the time of their erection, just as the names of places preserve the language of their early occupants. Through commercial and other intercourse, the artistic traditions of one country came to be adopted in others, and received different developments in each, as nations rose and fell in the progress of civilisation.

The later and more refined architecture of a country is generally based on some primitive, simple idea. Thus, in the early and rude times of nearly all nations, it has been the practice to erect a large single stone, or to heap up a pile of stones, as a monument to commemorate some great event. In Egypt and elsewhere we see this primitive idea preserved and developed in the great pyramids and obelisks of a later and more cultivated age. Under the Romans, a similar tradition is exemplified in the sumptuous mausoleums and commemorative pillars of the empire.

In the construction and decoration of buildings, the same principles hold. However elaborate and diversified the edifices of different times and countries may be, all their styles may be traced back to the two chief building materials of wood and stone. Every principle of architecture may be shown to be founded on the forms naturally adopted for construction in one or other of these materials. Wooden construction manifests itself in upright pillars with beams laid across them, hence called the *trabeate* system, while genuine stone building is distinguished by the employment of the arch with its necessary abutments. Most of the nations of antiquity, notably Egypt and Greece,

although acquainted with the use of the arch, preferred not to employ it in their monuments, but to adhere to the earlier and simpler *trabeate* type of the pillar and beam; and the details of their architecture, although executed in stone, contain evidences of their wooden origin in the traditional wooden features of triglyphs, metopes, &c.

The arch was well known to the Egyptians and Assyrians, and was used by them in tunnels and drains, but it was never adopted as a leading feature in architecture till about the time of the Roman empire. Having once permitted this emblem of true stone architecture to take a prominent place in their edifices, it soon showed its power by completely revolutionising the whole system. The external architecture, which the Romans had borrowed from the Greeks, was gradually converted into an internal architecture resulting from the development of arch-construction. From this principle, first adopted by the Romans, the whole of the subsequent architecture of Byzantium and the middle ages was evolved.

We thus see that the essential principles common to all architecture were handed down from one country and from one state of civilisation to another. In the same way, the decorative features developed in one age and country had great influence on succeeding nations. Egyptian art influenced Assyrian both in general forms and details, and both lent their aid to the Greeks, although in the simple and refined art of the latter there is some difficulty in recognising the more elaborate forms and decorations of their prototypes. The influence of Greek art on Roman is very apparent in every feature, while that of the latter on Byzantine and Gothic architecture, although more subtle, is none the less powerful.

This article treats very briefly of the history of the various styles of architecture, of which more details are given under their separate headings.

Egyptian.—The history of architecture may be said to begin with the construction of the Egyptian Pyramids, 3000 years or more before the birth of Christ, but it is long after this—namely, 2570 B.C.—ere we find in Egypt a form of structure which contains the germ of a style practised at a later age in Greece. One or more of the tombs at Beni-Hassan are of the latter date, and have pillars which have so much in common with the style of those of the earliest Grecian temples, that they have been said to belong to a pre-Doric order. No doubt the great temples at Thebes, Karnae, and other places, built at a still later time than these tombs, more or less determined the general forms of buildings of a similar nature subsequently erected in Assyria.

Assyrian. Assyria comes next to Egypt for the age and importance of its buildings. The remains of some of these, which are chiefly palaces, are of great splendour. Among the oldest hitherto excavated is the North-west Palace at Nimrud, built about 884 B.C. Their peculiar style of architecture is familiar to those who have read Mr Layard's work on his discoveries at Nineveh.

Persian. Persia possesses in the remarkable ruins of palaces at Persepolis and Susa, built in the 5th and 6th centuries B.C., remains which bear a close resemblance to those of Assyria. The constructional parts of these Persian buildings being chiefly of marble, where those of the Assyrians were of wood, have been much better preserved. French explorers have discovered at Susa, a portion of an ancient palace built of bricks faced with enamelled columns. Fergusson pointed out that the Greeks got their first idea of the Ionic capital from buildings in Assyria and Persia. Indeed, he considered that the earliest form of the Corinthian capital could likewise be traced to these sources.

Indian.—Examples of almost every kind of construction, both in wood and stone, are to be found in the various styles of this wonderful country. Until recent years, it was believed that the cave-temples of India were of a very early date, but it has now been ascertained that none of these go further back than the 6th or 7th century of our era. All other ancient monuments in India, with the exception of the topes or pillars erected by the powerful ruler Asoka, are of still more recent date.

Greek.—Ancient Greek architecture is almost wholly represented by temples and theatres, the remains of which are found not only in Greece itself, but in Southern Italy, Asia Minor, and certain districts in North Africa. Some of these, as their ruins show—notably the temple of Diana at Ephesus—were originally of great size; and their architecture, even in its minutest details, is of a very refined character. The Grecian style embraces three orders, called the Doric, the Ionic, and the Corinthian. The most marked, though not the only distinguishing feature in these, is the capital of the column. The architecture of ancient Greece flourished from 650 to 324 B.C.

Roman.—The Romans borrowed their early architecture from that of Greece and Etruria, but about Roman buildings erected much before the Christian era very little is known. In Egypt, Assyria, Greece, and Etruria, architecture was chiefly confined to tombs, temples, palaces, or theatres. The Romans, however, applied it to many other purposes, such as basilicas, baths, bridges, aqueducts, triumphal arches, and domestic buildings. The circular and pointed arch, though known to earlier nations, seems to have been first used as a conspicuous feature by the Etruscans, whose buildings were chiefly tombs and city-walls and gates. From them the Romans borrowed the round arch, and put it to both a constructive and an ornamental use in almost all their buildings. They soon advanced a step further, and applied it as a vault in rectangular and circular edifices. By the Romans, the Grecian orders were modified in their proportions and details, and two others were added—namely, the Tuscan (a variety of the Roman Doric) and the Composite. In many of their buildings, such as the Colosseum, built 80 A.D. (see AMPHITHEATRE), the orders are piled over each other, dividing the great height of the external wall into several tiers or stories. Besides the Colosseum, the Pantheon, the Theatre of Marcellus, and the remains of temples, baths with their great vaulted halls, triumphal arches, and other monuments, still survive as examples of ancient architecture in Rome itself, built between the time of Augustus in the last century B.C., and that of Constantine in the 4th century A.D. At Pompeii, there are interesting examples of the domestic architecture of the 1st century of our era. Many important ancient Roman remains are likewise found not only in Italy, but in other countries subject to the empire in Europe, Asia, and Africa.

Byzantine.—With the establishment of Byzantium as the capital of the empire, the Roman style of architecture was naturally much practised there, and in particular the development of the dome became from the first a chief object with the eastern architects. Christians were first allowed to erect places of worship in the reign of Constantine the Great. The old basilicas, or courts of justice, were then turned into churches, for which they were well suited. Professor Baldwin Brown, of Edinburgh, has attempted to prove that the humble *schola*, or hall of meeting, such as was used by the early Christians, as well as by heathen clubs and associations, rather than the basilica, was the original form of the Christian church. The name Byzantine is, strictly speaking, only

applicable to the Christian architecture of Eastern Europe and Asia Minor, erected from the reign of Justinian to the 11th century; but the style continued in use, in a less pure form, till the Mohammedans subdued the Christian countries of the East. One of the finest buildings in this style is the church of St Sophia at Constantinople, founded by Constantine, but rebuilt by Justinian in 547 A.D. The cathedral of San Vitale at Ravenna, also erected in the 6th century, and St Mark's at Venice, built by architects from Constantinople in the 10th century, are two of the most perfect and interesting Byzantine churches in Italy.

Romanesque is the general term applied to all the various round-arched styles which arose in Western Europe, after the irruptions of the barbarians had ceased. It was founded partly on the Roman remains existing in different countries, and also, to a large extent, on the influence of the still flourishing Byzantine art on the awakening communities of the West. *Teutonic Romanesque* may be regarded as synonymous with Rhenish architecture. The cathedrals of Spire, Mayence, and Worms are examples.—*Lombard Architecture*, the form of Romanesque practised in Lombardy. Examples of it are to be seen in St Ambrogio at Milan, St Abondio at Como, and the cathedrals of Parma and Piacenza. The Romanesque styles of Lombardy and countries north of the Alps, including the Norman of France and England, prevailed during the 11th and 12th centuries.

Saxon or Pre-Norman.—The Norman style would link on more naturally than this with the Teutonic Romanesque. But the Saxon is prior in point of date, and is the earliest of our native styles. It is simple, and has, as a rule, coarsely dressed masonry. The 'long and short work' of the corners and other parts are very probably imitations of woodwork. In whole or in part, the churches of Bradford (Wilts), Earl's Barton, Worth, Monkwearmouth, and other places in England; and perhaps that of St Regulus at St Andrews, in Scotland, are pre-Norman. But there are some curious problems still to solve about these buildings erected prior to the Norman Conquest.

Norman. This style is also sometimes called Romanesque. No kind of architecture is better known in England and Scotland than the Norman, owing to the abundance of examples which remain. It is characterised by round-headed openings, by flat buttresses like pilasters, by 'embellished' masonry, and by the richness and quaintness of the carving, especially on many of the doorways and chancel arches of even the smaller churches. In the cathedrals and large churches the pillars dividing the aisles from the nave are very massive. Among the many examples in England may be mentioned the cathedrals of Durham, Canterbury, Peterborough, and parts of Lincoln and Winchester. In Scotland, Kirkwall Cathedral is the most complete example on a large scale; but the abbeys of Dunfermline, Kelso, and Jedburgh are also fine, though fragmentary. The small churches of Dalmeny and Leuchars have rich carving.

Under the general term *Gothic Architecture* (q.v.) some writers include the Norman style. More usually, however, the name Gothic is understood to mean the pointed styles of architecture, which succeeded the Romanesque and Norman.

Early English or First Pointed Style.—As soon as the transition from the Norman to first pointed architecture was complete, the latter was characterised by its narrow pointed or 'lancet' windows, without any, or with only very simple, tracery. Further distinguishing features are high gables and roofs, and simple pinnacles and spires. Buttresses are deep instead of shallow, as in the Norman,

and shafts slender, whether they are simple or clustered. The capital is bell-shaped, either with plain mouldings or with bold and graceful foliage, and the Abacus (q.v.) in this country is round instead of square. The mouldings consist of projecting rounds and deep retiring hollows, which give strong light and shade. In England, Salisbury Cathedral is wholly in this style, so also are the nave and transepts of Westminster Abbey. Scotland has good examples of it in the choir of Glasgow, and in most of what remains of Elgin Cathedral. This style lasted from towards the end of the 12th to near the end of the 13th century.

Transition.—At the former date a change is observable in the window-tracery, the foliage, &c., indicating that the style is gradually altering or undergoing a transition to the

Decorated, Second Pointed, or Middle Pointed Style.—Windows are now divided into a number of lights by comparatively thin mullions, and their upper portions filled with beautiful tracery, which at first was of geometrical forms, such as combinations of circles, trefoils, and quatrefoils. But in the later period of the style, the tracery becomes wavy and flowing, and of almost endless variety. Ordinary buttresses are more enriched than in the earlier style, and flying-buttresses, though not for the first time used, are now common. A continuation of the arch-mouldings, instead of shafts with caps, at length characterises the jambs of the doorways. All the smaller ornaments and foliage are rich, free, and graceful. This is generally considered the most perfect and beautiful style of Gothic architecture. As examples of it, may be mentioned the choir of Lincoln and the nave of York Cathedral; and in Scotland portions of Melrose Abbey. The style continued from about 1274 to 1377. It then gradually stiffened into what is called the

Perpendicular, Third Pointed, or Late Pointed Style.—This is easily distinguished from the previous style by the tracery of the windows, which is characterised by an upright and square tendency. Perpendicular lines prevail in the windows as well as in the ornamental paneling. The doorways have square heads over pointed arches. Gables and roofs are at a low angle. Clerestory windows are more frequently square-headed than arched. It is only in this style that we find the depressed four-centred or Tudor arch, although arches with two centres are also used. Rich fan tracery (q.v.) appears in the vaulting, and ornamented open timber roofs are frequent (see Roof). The perpendicular style is not represented in continental Gothic buildings. Westminster Hall, London, is an early example of this style. Henry VII.'s Chapel, Westminster Abbey, has beautiful fan-tracery. Somersetshire is peculiarly rich in churches of this period. In Scotland, the great east window of Melrose Abbey is a good example. The style prevailed from the end of the 14th to the middle of the 16th century. The later portion of this period is sometimes called the *Tudor style*. The elaborately ornamented *Flamboyant* (q.v.) style was the latest style of Gothic in France (15th and 16th centuries). The Municipal Architecture (q.v.) of the middle ages was largely Gothic in type.

Under the head **GOthic ARCHITECTURE** will be found some account of buildings belonging to the different periods of pointed architecture on the Continent.

Roman or classic architecture may be said to have never entirely died out in Rome, and when, in the 15th century, the revival of classic literature and taste took place, the ancient classic style of architecture naturally revived along with them. This is called the *Italian Renaissance*. Buildings,

many of which are famous, erected at Rome, Florence, Venice, and other places in Italy, from the beginning of the 15th to the end of the 17th century, and some would say even later, are included under the general term Italian architecture. The name Renaissance is likewise given to it, but this term is also applied to architectural works erected in other parts of Europe after the decay of Gothic architecture in the 16th century; and in a wide sense it includes all edifices built in a classical (but not when of a purely Greek) style from that time to our own. It comprises so many diversities that it is hardly possible to define it with any kind of precision. Renaissance as applied to architecture means a revival of classical features and details as distinguished from those which characterise the Gothic. St Peter's at Rome; the Pitti Palace at Florence; various palaces on the grand canal at Venice; the Louvre and Tuileries at Paris; the Banqueting House in Whitehall, and St Paul's Cathedral, London, are all examples of Renaissance.

Elizabethan Architecture (q.v.), and the corresponding style on the Continent, is a variety of Renaissance, in which Gothic and Italian features are somewhat mixed. Holland House, near London, as well as Hatfield House, Burleigh House, and Hardwick Hall, in other parts of England, are well known buildings in this style; so also is Heriot's Hospital at Edinburgh.

Arabian, Saracenic, or Moorish.—This singular and beautiful style of architecture appears to have first taken a definite character in the 9th century, and was probably based on Persian, together with some of the elements of Roman and Byzantine art. The style is noted for its elegant domes, often with remarkable external decoration; for its graceful minarets or towers, lessening in diameter stage by stage as they rise; for the frequent use of the pointed arch, and of the horseshoe arch; and in some cases for the peculiarly slender columns which support the walls above them. The flat or surface decorations are peculiarly striking and effective. These consist of diaper-work, often richly perforated; and of scroll-work of great variety, often of fairy-like lightness. The stalactitic-looking pendentives, filling up such places as the corners of ceilings, have a remarkably fine effect. Several mosques and other buildings at Cairo, a peculiar class of houses in Algiers, and the Moorish palace of the Alhambra, as well as the mosque of Cordova, in Spain, furnish striking illustrations of this kind of architecture.

Modern Architecture. This title is generally applied to the architecture which has been used by European nations since the time of the Renaissance. The Renaissance, as we have seen, was a revival of Roman architecture, the study of which naturally led to an acquaintance with its prototype, the architecture of Greece. The examination of Grecian buildings, and the revival of their style, was much encouraged in the 18th century. In the beginning of the 19th century, the habit of imitating ancient styles had been established, and began to be applied to Gothic architecture also, which speedily came to be generally adopted, especially for ecclesiastical edifices. This has been particularly the case in Great Britain, and amongst the Anglo-Saxon race wherever found—in America, India, and Australia, as well as at home. All modern architecture is imitative, and it is doubtful whether a really new style is possible. At present Gothic is generally adopted for churches, and Renaissance for domestic buildings. The Houses of Parliament at Westminster are one great example of an attempt to apply Gothic to a secular building, and the Law Courts recently erected in London are another. In France, the birthplace

of Gothic, it is little practised, the French having adopted a special modification of the Renaissance, which is known as the 'French style.' Most of the great modern towns, such as Paris, Lyons, and Marseilles, have been largely rebuilt in this style. In Germany and Italy the purer classic examples have been more frequently followed; but in recent years there has been a strong tendency both in Germany and this country to follow the style of the Renaissance as practised in each country during the 16th and 17th centuries. The architecture of America follows very much the same course as that of Europe. See Fergusson's *Handbook of Architecture*; Ruskin's *Seven Lamps of Architecture*; the works of Pugin, Viollet le Duc, Parker, Freeman; and works on special departments of architecture noted under the several articles therein.

The domestic architecture of each style will, when practicable, be treated under the different headings. Each of the principal styles of architecture, briefly characterised above, receives separate treatment at its own alphabetical place in this work. Amongst numerous other articles on architectural subjects are:

Aisle.	Column.	Gargoyles.
Alhambra.	Cornice.	Lancet-window
Apse.	Crochets.	Mullion.
Aqueduct.	Cusp.	Pillar.
Arch.	Cyclopean.	Piscina.
Architrave.	Diaper.	Porch.
Baptistry.	Domestic Architecture.	Quatrefoil.
Basilica.	Door.	Restoration.
Belfry.	Ellora.	Round Tower.
Canopy.	Entablature.	Spire.
Castle.	Frieze.	Tooth ornament.
Church.	Frieze-tracery.	Tracery.
Cinquefoil.	Finial.	Window.
Cloister.	Flamboyant.	

Architrave (Gr. *archi-*, 'chief;' Lat. *trabs*, 'beam'), the lowest part of the Entablature (q.v.), or that which rests immediately upon the columns. See COLUMN.

Archives. See RECORDS.

Archivolt, the ornamental band or moulding which runs round the lower part of the vousoirs of an arch.

Archon, the highest magistrate in Athens. The government was originally monarchical; but on the death of Codrus (q.v.), the Athenians, according to the traditional account, resolved that no one should succeed him with the title of king (*basileus*), and therefore appointed his son Medon with the title of *archon* (ruler). The office was at first for life, and confined to the family of Medon; but in 752 B.C. the term of office was limited to ten years; and in 714 the exclusive claims of Medon's family to the office were abrogated, and it was thrown open to all persons of noble birth, afterwards by Aristides to all citizens without distinction of rank (477 B.C.). In 683 the office had been made annual, and the number of archons had been extended to nine. The first archon was styled *Eponymos*, and from him the year was named; to the second, styled *Basileus*, belonged the care of religious affairs; the third was *Polemarchos*, or commander-in-chief; and the remaining six, having to conduct all criminal trials, were styled *Thesmothetæ*, or lawgivers.

Archpriest. Archpriest was the title given to the superiors who were appointed by the pope to govern the secular priests sent into England from the foreign seminaries during the period 1598-1621. On the death of Cardinal Allen, in 1594, the missionary priests were left without a head. Dissensions had already sprung up between the secular clergy and the Jesuits. The need of some superior was evident. Some wished for the ordinary government of bishops. The Jesuits desired to keep the control of affairs in their own hands.

Through the influence of Father Parsons, Clement VIII. commissioned Cardinal Cajetan, called the Protector of England, to appoint George Blackwell archpriest, with jurisdiction over the secular clergy of both England and Scotland (March 1598). The archpriest was to have twelve assistants, but among other instructions given to him was an order that in all matters of importance he should consult the superior of the Jesuits in England, at that time Father Garnet. It is said that Parsons's object in thus placing the direction of British Catholics in the hands of one man subservient to the Jesuits, was the better to further the political projects of his own or the Spanish party in view of the succession to the crown. The leading secular clergy protested against the novel appointment as irregular in its institution, made upon false and fraudulent information, and oppressive in its action. They finally (November 1600) drew up a formal appeal, signed by thirty-three priests, and, secretly aided by the queen and council, sent four of their number to represent their cause at Rome. Some of the grievances complained of were at length redressed, and the archpriest's abuse of power and the influence of the Jesuits controlled, but the form of government was retained. Blackwell was deprived in 1608 for taking, and persuading others to take, the oath of allegiance, which had been condemned by Urban V. He died in a London prison five years afterwards.

George Birket or Birkhead, who was appointed in Blackwell's place in 1608, died in 1614. The third and last archpriest was Dr William Harrison, who ruled the clergy in this capacity till his death in 1621. Harrison had himself urged upon Rome the appointment of bishops, while the Jesuits in their turn now sought the aid of the government in opposing it. In 1623 William Bishop, the chief antagonist of Blackwell, and a leader of the appellants, was made titular Bishop of Chalcedon, and vicar-apostolic of England and Scotland.

Archytas OF TARENTUM, one of the most illustrious men of antiquity, flourished about 400 B.C., and was accordingly a contemporary of Plato. His public career was glorious. He was seven times elected general of his city, and was victorious in every campaign. His civil administration was equally fortunate; and he was no less distinguished as a mathematician and philosopher. His virtues were as conspicuous as his talents; he was unselfish, moderate, and humane; and although one of the greatest geometers, he did not disdain to make toys for his children. He solved the problem of the doubling of the cubes, and secured almost the reputation of a magician by his numerous mechanical contrivances, the most wonderful of which was the flying pigeon. A Pythagorean in philosophy, he is supposed to have exerted an influence on Plato, and some affirm that Aristotle was indebted to him for the idea of his categories. Only unimportant fragments of his writings remain. They relate to metaphysics, ethics, logic, and physics. Horace says he was drowned in the Adriatic.

Arcis-sur-Aube, a town of 3000 inhabitants in the French department of Aube, on the navigable Aube, 22 miles N. of Troyes by rail. It was the birthplace of Danton, and near it a battle was fought, March 20-21, 1814, between Napoleon and the allied forces under Prince Schwarzenberg, ending in a French retreat.

Arcole, a village on the left bank of the Adige, in Northern Italy, 15 miles ESE. of Verona, famous for the victory gained by Napoleon over the Austrians, 15th to 17th November 1796.

Arcos de la Fronteira, a town on the right bank of the Guadalete, in the Spanish province

of Cadiz, 20 miles ENE. of Xeres. It has a romantic situation, on a rocky hill, and was called *de la Frontera*, from its having stood on the frontiers of the old Moorish kingdom of Granada. Almost impregnable by nature, it was furthermore embattled with walls and towers, part of which still remain. It manufactures leather, hats, and articles made of esparto grass; and produces wine, oil, and fruit. Pop. (1878) 16,280.

Arcot (*Aru-Kudu*, 'six deserts'), a city of British India, in the presidency of Madras, the capital of the district of North Arcot. It is situated on the right bank of the Palar, 5 miles from Arcot railway station, and 65 WSW. of Madras. Besides the military cantonment, which can accommodate three regiments of cavalry, Arcot contains some mosques in a tolerable state of repair, and the ruins of the Nawab's palace. In 1751 Clive, with 300 Sepoys and 200 Europeans, marched against Arcot, which was garrisoned by 1100 men; and after having taken it, had in his turn to withstand a siege of fifty days. Arcot was afterwards captured by the French, but retaken by Colonel Coote in 1760. It was taken and held for a time by Hyder Ali, but passed into the hands of the British in 1801. Pop. (1871) 10,988; (1881) 12,000.

The districts of NORTH and SOUTH ARCOT form a portion of the presidency of Madras. They are dependent on tanks in the dry season, and have suffered severely from famines. Area of North Arcot, 7139 sq. m.; pop. (1881) 1,817,561; area of South Arcot, 4873 sq. m.; pop. (1881) 1,815,151.

Arctic means, properly, lying near the constellation of the Bear (Gr. *arctos*) or Ursa Major (q.v.), and hence, northern. The Arctic Circle is a circle drawn round the North Pole, at a distance from it equal to the obliquity of the ecliptic, or 23½°. The corresponding circle round the South Pole is the Antarctic Circle. Within each of these circles there is a period of the year when the sun does not set, and another when he is never seen, this latter period being longer the nearer to the pole. The word is also used figuratively to express extreme cold.

Arctic Animals. The region north of the cultivation of cereals is peopled by a limited and homogeneous fauna. Mammals are represented almost exclusively by ruminants, carnivores, and rodents, such as the Arctic fox, polar bear, glutton, ermine, sable, walrus, tail-less hare, lemming, reindeer, and musk-ox. Birds are represented especially by the snow-partridges, snowy owl, Iceland falcon, eider-duck, auks, divers, and guillemots. No reptiles can live in the cold of the arctic regions; but fishes, especially Salmonide, are well represented. Insects and molluscs are fairly numerous. Not a few of the birds and mammals inhabiting these snowy regions exhibit adaptive characters of white colour, thick coats, accumulations of fat, and the like. See GEOGRAPHICAL DISTRIBUTION; Pennant's *Arctic Zoology*; and Heilprin's *Distribution of Animals* (Internat. Sc. Series, 1887).

Arctic Ocean. The Arctic Ocean lies to the north of Europe, Asia, and North America, and surrounds the North Pole; it is usually defined as the water area within the Arctic Circle. The influence of the Gulf Stream, however, carries a relatively mild climate a long way within the Arctic Circle off the coasts of Norway; and, on the other hand, the Arctic currents along the east coast of Greenland, and through Davis Strait, bring down Arctic conditions a long distance into the Atlantic. Physiographically, the Norwegian Sea and Greenland Sea, situated between Norway and Greenland, belong to the same basin as the Arctic Ocean, it being cut off from the Atlantic by the

ridges stretching between Greenland, Iceland, the Farø Islands, and the north of Scotland, which have an average depth over them of 240 fathoms. If the Arctic Ocean be regarded as lying wholly within the Arctic Circle, then it is almost land-locked between that circle and the parallel of 70° N. It communicates with the Pacific by Behring Strait, and with the Atlantic through Davis Strait and the wide sea between Norway and Greenland. The area of the ocean is about 5,500,000 sq. m., and into it there drain about 8,600,000 sq. m. of land. The rainfall on this land is estimated at 2100 cubic miles per annum. The coasts of Europe and Asia are low, and have several deep indentations, the principal being the White Sea and Gulf of Obi. The shores of North America are skirted by a most irregular assemblage of islands, forming numerous gulfs, bays, and channels. The principal islands of the Arctic Ocean are Greenland, Spitzbergen, Franz-Josef Land, Nova Zembla, New Siberia, Wrangel Island, Prince Patrick Island, Melville Island, Banks Land, Ellesmere Land, Grinnell Land, &c. The principal rivers from Asia are the Lena, Yenesei, and Obi; from Europe, the Omega, Dwina, and Petchora; from America, the Mackenzie. The Arctic highlands are covered with an enormous depth of snow and ice. In some places this results in the formation of great glaciers, one of the most remarkable of which is the Humboldt Glacier, in 79° N. lat., on the west coast of Greenland. There are, however, no large, flat-topped tabular icebergs, like those of the southern hemisphere, within the Arctic Ocean; and this of itself is good evidence that there is no expanse of land towards the North Pole. The whole ocean is covered by immense ice-fields from 5 to 50 feet in thickness. During winter these are bound together by the severe frost, but these continuous masses break up during the summer months into floes and floe-bergs. Sometimes vast spaces of water and long lanes are formed between the floes and ice-fields, and these have, doubtless, given rise to the notions regarding an open Polar Sea which at one time prevailed. When these great floating ice-fields come together, the margins where they collide are piled up on each other, and thus is produced the well-known hummocky ice-floes. When this hummocky ice is jammed against a shallow shore, and becomes fixed for long periods of time, the appearances are produced to which Nares gave the name of 'Palæocrystic Sea.' In the more open parts of the ocean the ice is, however, always in motion. Immense quantities of field and hummocky ice pass down each year between Spitzbergen and Greenland, and Greenland and Iceland, these waters being almost always blocked. Frozen in this ice, whole pine-trees are not uncommonly found; these have most probably been carried right across the pole, after having been carried into the Arctic Ocean by the rivers of the Old and New World. Large fresh-water ponds and lakes are formed on the ice-fields during summer by the rain and melting snow. When these are frozen again, a 'black ice' is formed, which contrasts strongly with the 'white ice' formed from salt water. The whalers supply themselves with water by picking up the 'black ice.' Parry found, as he travelled over the ice north of Spitzbergen, that it was moving in a body to the south. He reached a latitude of 82° 45', Markham reached 83° 20', and Lockwood (of Greely's expedition, 1882) 83° 24', the most northerly point yet attained. In 1850 McVine entered Behring Strait, and brought his crew home by Davis Strait, thus discovering the *North-west Passage*. In 1878 and 1879 Nordenskiöld sailed from the Atlantic to the Pacific along the northern shores of Europe and Asia, thus discovering the *North-east Passage*.

Throughout the whole of the Arctic basin, ice-cold water is found from surface to bottom, except off the Norwegian shores, where it is met with at depths varying from 400 to 600 fathoms beneath the surface. This cold Arctic water penetrates the Farøe Channel at the bottom, as far as the north of Scotland, where it is stopped by the Wyville-Thomson Ridge running between the Farøe banks and the north of Scotland; on the north of this ridge there is, at a depth of 400 and 500 fathoms, a temperature of 30° F.; while on the south side, at the same depths, the temperature is 45° F. The width of this ridge is about 10 miles, and on it there is a depth of 250 fathoms. The warm Gulf Stream water flows over this ridge and on to the coasts of Norway, rendering its northern shores and those of Lapland relatively mild and habitable, the 'uly temperature off the North Cape being 47° F. Musk-oxen, reindeer, foxes, hares, and wolves are met with on Arctic land. Polar bears roam widely over the ice-fields. Whales, walruses, narwhals, and seals abound. Guillemots, little auks, gulls, and other sea-birds are found in vast numbers near Spitzbergen and other islands. Eider-ducks nest on the low lands, and their down is collected as an article of commerce. There are valuable seal, whale, walrus, and shark fisheries; and cod, mackerel, herring, and lobsters are also captured. There is a great amount of invertebrate life at the surface of the sea, and diatoms are also abundant. The Norwegian expeditions show that life exists at great depths, but it is by no means so abundant as in the Antarctic. The ocean appears to be shallow to the north of Europe and Asia, the depth 500 miles to the north of the Lena being only 38 fathoms; and Markham found only 72 fathoms at his most northerly point off the American coast. Between Spitzbergen and Lapland the depths are from 100 to 200 fathoms; but between Spitzbergen and the north of Greenland there is a deep opening into the frozen sea, where the depth is 2500 fathoms. Between Norway and Iceland and Greenland the depths are sometimes over 2000 fathoms, and generally over 1000 fathoms in the central parts. The depths in Behring Strait are less than 100 fathoms. The deposits in the Arctic Ocean are blue muds, composed almost wholly of land débris. In the south-east portions of the Norwegian Sea, some of the deposits approach in character to a globigerina ooze. South westerly winds prevail along the coasts of Norway, and as far as Franz-Josef Land; to the westward of this line, north-easterly winds prevail. In winter, winds blow from Northern Asia to the Arctic Ocean; in summer, from the ocean to the land. The direction of the winds over the Arctic Ocean at different seasons is controlled by the positions of the barometric maxima and minima in the north parts of Asia and the North Atlantic. Fogs and mists are of most frequent occurrence during the six months of day and summer. In winter the temperature of the air is sometimes as low as - 47° F., and in summer is usually a little above the freezing-point. There is a large export trade in fossil ivory from the New Siberia (Liakhoff) Islands. This consists of the tusks of the mammoth, whose remains are abundant in Northern Russia. For an account of Arctic expeditions, see POLAR EXPLOREATION.

Arctium. See BURDOCK.

Arctomys. See MARMOT.

Ar'cus Seni'lis (Lat., 'the bow of old age'), a narrow white or yellowish band close to, but within the margin of the cornea (see EYE), caused by fatty degeneration of its tissue. It usually begins during middle life, first at the upper, then at the lower part of the cornea; before old age is reached, these two arcs have generally united at

the sides to form a ring. It is frequently associated with Atherosclerosis (see ARTERIES, *Diseases of*), but it is of no other practical importance.

Ard. or **ARRI**, a Celtic root, meaning 'height' (cf. Lat. *ardens*, 'high'), which appears in many geographical names, especially in Ireland and Scotland.

Ardahan, a village of about 300 houses in the portion of Turkish Armenia ceded in 1878 to Russia, 35 miles NW. of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854-56; in 1878 the Berlin Congress sanctioned the cession to Russia of Ardahan, which had been captured early in the war. On account of the severity of the climate, the houses of Ardahan are mainly constructed underground.

Ardalan, a province in the west of Persia, embracing the basin of the Shirwan Rûd. It is generally mountainous, but the valleys are very fertile, and if well watered, yield cereals and fruits in abundance. Area, 6000 sq. m.; estimated pop. 150,000. Capital, Kermanshah (q.v.).

Ardea. See HERON.

Ardebil, a town of Persia, in the province of Azerbaijan, 110 miles E. of Tabriz, and some 5000 feet above the sea. Pop. about 10,000.

Ardèche, a department in the south of France, takes its name from a tributary of the Rhone, and includes part of ancient Languedoc. It is almost wholly mountainous. In the NW. of the department, the Cevennes culminate in the volcanic Mont-Mézène, 5752 feet in height. Numerous extinct volcanic peaks, deep craters, grottos, rock-labyrinths, and basaltic columns, give an extraordinarily picturesque appearance to the scenery. The upland, where winter reigns for six or eight months, is devoted to pasturage; but the valley of the Rhone produces wine, olives, chestnuts, figs, and almonds. Only a fourth of the area is cultivated. Iron, coal, antimony, lead, marble, and gypsum are wrought. There are manufactures of silk, paper, leather, cloth, and straw. Area, 2136 sq. m.; pop. (1886) 375,472. The capital is Privas.

Ardee, a town in the west of County Louth, Ireland, on the river Dee, 12 miles inland. The ancient castle, built about the year 1200, is now used as the town-house; there is a handsome convent here. Pop. 3000.

Ardennes, an extensive hill-country and forest, occupying the SE. corner of Belgium, between the Moselle and the Meuse, but extending also into France and Rhenish Prussia. It consists of a broken mass of hills, for the most part of no great elevation, which gradually slope towards the plains of Flanders. The average height of the hills is less than 1600 feet; but in the east, they attain an elevation of about 2100 feet. Large tracts of this region consist not of hills, but of gently undulating plateaus, in some districts densely covered with oak and beech forests, but for the most part heathy, marshy, and barren. The channel of the Meuse is in some places bound in by rugged and precipitous cliffs more than 600 feet high. The principal rocks of the Ardennes are clay-slate, graywacke, quartz rock, and various metamorphic rocks; besides which occur in various places extensive outcrops of crystalline limestone. The wealth of the region is its wood and its minerals. Enormous supplies of coal are found in the north, a very important element in Belgium's industrial wealth; iron, lead, antimony, copper, and manganese are also found. Multitudes of cattle and sheep are reared. The *Ardennna Silca* of the Romans extended over a still wider area. See Montagnac, *Les Ardennes* (2 vols. Par. 1875);

Lindley, *Walks in the Ardennes* (1887).—Shakespeare's Forest of Arden is a district in Warwickshire, extending from the Avon to near Birmingham.

Ardennes, a frontier department of France, bordering on Belgium. It is named from the forest of Ardennes, and formed a part of the old province of Champagne. Length from north to south, 63 miles; area, 2020 sq. m. The NE. belongs to the basin of the Meuse; the SW. is watered by the Aisne; these rivers being united by a canal. About two-fifths of the whole surface is hilly, and covered with forests and wide tracts of pasturage. In the north, marble is obtained; but the prevailing rock is limestone. South of this, and stretching across the department from east to west, are great layers of slate. Only the valleys are fertile, and produce corn. The vine is cultivated in the SW. Cattle and sheep are reared. Slate, marble, iron, clay, copper, and coal are found. Iron-working is largely carried on; but the chief industry is cloth-making, especially in Sedan. There are also manufactures of clay-pipes, glass, paper, sugar, and beer. The capital is Mézières, but the most important place is the great fortified city of Sedan. Pop. of department (1886), 332,759.

Arditi, LUIGI, musician and composer, born 22d July 1822, in Piedmont, studied music at the Conservatoire of Milan. Famous first as a violinist, then as a conductor, he came to London in 1857, and from that year till 1878 was musical director at Her Majesty's Theatre. He has conducted Italian opera and concerts in places as remote from one another as New York and Constantinople; has published the operas *I Briganti* (1841) and *La Spia* (1856); and is known as author of much popular music—songs, violin duets, and waltzes such as *Il Bacio*.

Ardnamur'chan Point, a rugged headland of Argyllshire, the most westerly point of the mainland of Britain. A castle-like lighthouse was built here in 1849.

Ar'doch, a place in Perthshire, 12 miles NNE. of Stirling, celebrated for a Roman camp, the most entire in Britain. The intrenched works form a rectangle 500 by 430 feet, the four sides facing the cardinal points. The north and east sides are protected by five deep ditches and six ramparts, these works being 270 feet broad on the north side, and 180 feet on the east. A deep morass exists on the SE., and the perpendicular banks of Knaik Water, rising 50 feet high, protect the camp on the west. The pretorium, or general's quarters, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a square of 60 feet each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the pretorium under the bed of the Knaik. Not far north of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist.

Ardoye, a town of Belgium, in the province of West Flanders, 17 miles S. of Bruges. It has extensive cloth-weaving works. Pop. (1882) 6082.

Ardros'san, a seaport and watering-place in Ayrshire, 1 mile WNW. of Saltcoats, and 32 miles SW. of Glasgow by rail. It owes its rise to Hugh, Earl of Eglinton, who began the formation of the present town and harbour in 1806, and who planned magnificent works, and spent vast sums in striving to make this the port of Glasgow. Suspended in 1815, these works were resumed in 1833, and now the harbour, which is sheltered by an islet, is one

of the safest and most accessible on the west coast of Scotland. A new dock was begun in 1887. The chief exports are coal and pig-iron; the chief imports, timber, grain, limestone, and iron-ore. On a hill above the town stands a fragment of Ardrossan Castle, said to have been surprised by Wallace, who slew its English garrison, and threw the dead bodies into a dungeon called 'Wallace's Larder.' Pop. (1881) 4036.

Are (Lat. *arca*), the unit of the French land-measure, is a square, the side of which is 10 metres (or 32·809 feet) long (see METRE), and which therefore contains 100 square metres = 119·6 English square yards. The next denomination in the ascending scale is the *decaare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares. = 2·47 English statute or imperial acres.

Area (Lat.) is a term in mathematics meaning *quantity of surface*. The calculation of areas, or mensuration of surfaces, is one of the objects of geometry. The measuring unit is a square inch, a square foot, &c. according to the unit of length. As a figure is thus measured by finding an equivalent for its surface in *squares*, the process is sometimes called the *quadrature* of the figure. See QUADRATURE, MENSURATION, SURVEYING.

Are'ca, a genus of palm, containing several species, having pinnate leaves and double spathes. The fruit is a fibrous one-seeded drupe, a nut with an outer fibrous husk. *A. catechu*, the Penang Palm, or Betel-nut Palm, is a native of the East Indies, whose nut yields a sort of Catechu (q.v.). This Areca-nut, or Betel-nut, is very much used in many parts of the East, the chewing of it with quicklime and the leaf of the betel pepper being one of the most prevalent habits of the people (see BETEL). The nut is about the size of a hen's egg; the fibrous husk about half an inch thick. It is austere and astringent. It is doubtful if it possesses a narcotic power, or if this is to be ascribed entirely to the leaf which is used along with it. Areca-nuts form a considerable article of trade in the East, and are to some extent imported as a source of tooth-powder. The timber of the palm which produces them, and its leaf-stalks and spathes, are also used for domestic purposes. The tree is often 40 or 50 feet high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets more than a yard long. In Malabar, an intoxicating lozenge is prepared from the sap.—*A. glaberrima*, the Cabbage Palm of the West Indies, is a very tall tree, 100 to 200 feet, whose huge terminal leaf-bud is sweet and nutritious, and is sometimes used for the table as cabbage, but when it is cut off, the tree is destroyed. The stem of this tree, notwithstanding its great height, is remarkably slender.—*A. sapida*, the New Zealand Palm, is remarkable as extending southward beyond the geographical limits of any other of its order, as far indeed as 38° 22' S. lat. It is a small palm, only from 6 to 10 feet high, with leaves 4 to 6 feet long. The young inflorescence is eaten.

Arecibo, a town on the north coast of the Spanish West Indian island of Porto Rico, 45 miles W. of San Juan. Pop. 10,000.

Are'na, a part of an amphitheatre where the combats of gladiators and wild beasts took place. It was so called because it was usually strewn with sand (Lat. *arena*).

Arena'ceous Rocks. All rocks composed entirely, or to a large extent, of grains of quartz are included under this title. Beds of loose sand occur extensively in the more recent deposits. The grains, either of quartz or flint, are generally

water-worn and rounded; in some cases, however, they are more or less angular, or rounded and angular grains occur commingled. In older deposits, the grains of sand are bound together by siliceous, calcareous, argillaceous, or ferruginous cements. It is seldom that a rock is composed of quartzose materials alone; grains or particles of other mineral substances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; and they often occur in layers parallel to the planes of stratification, causing the rock to split into thin slabs, and exposing a glittering surface. These are called *micaceous sandstones*. When grains of felspar occur, it is a *felspathic sandstone*. Often large quantities of calcareous matter, either as cement or as distinct grains, occur; and these are called *calcareous sandstones*. In like manner we have *siliceous* and *ferruginous sandstones*, w. n silica and oxide of iron are conspicuously present as cementing or binding materials. Clay and carbonaceous matter, when plentifully diffused through the rock, give rise to *argillaceous*, *carbonaceous*, and *bituminous sandstones*. *Greensand*, or *glaucoditic sandstone*, is a rock containing abundant grains of the dirty greenish mineral called glauconite. *Arkose* is a sandstone composed of disintegrated granite; *volcanic sandstone*, *trappean sandstone*, &c. being composed of disintegrated igneous rocks. The presence of lime can always be detected by the effervescence which takes place on the application of hydrochloric or other acid. A sandstone of homogeneous composition, which may be worked freely in any direction, is called *freestone* or *liver-rock*. *Flagstone* is a sandstone which is capable of being split into thin beds or flags along the planes of deposition. When the sandstone is coarse-grained, it is usually called *grit*. If it contain, more or less abundantly, grains large enough to be called pebbles, the sandstone is said to be *conglomeratic*; and if the pebbles or stones be angular, the rock is described as a *brecciform sandstone*. Coarse-grained *grits* and *pebbly* or *conglomeratic sandstones* pass into *conglomerate* or *puddingstone*, which consists of a mass of various sized water-worn stones. *Brecciform sandstones* frequently pass into *breccia*, which is an aggregate of angular and subangular fragments. *Graywacke* is an argillaceous sandstone, more or less altered and sometimes senierystalline, met with among Palaeozoic formations.

Arenaria. See SANDWORT.

Arenberg (*Arenberg*), from 1644 till 1820 a small sovereign duchy of Germany, lying between Jülich and Cologne; now part of the district of Coblenz, Rhenish Prussia.

Ar'endal, a coast town in the south east of Norway, situated near the mouth of the Nidelv in the bay of Christiania. It is built partly on piles, partly on rock, and has been called 'Little Venice,' on account both of its picturesque appearance and of the canals which intersect it. The bay, which is protected by the island of Tromø, forms an excellent harbour, and favours the commerce of the town, which includes large exports of iron and timber. Pop. 4107.

Arends, LEOPOLD, founder of a widely popular system of stenography, was born near Wilna in Russia, December 1, 1817. Educated at Dorpat, in 1844 he settled in Berlin, where he died 22d December 1882. He wrote dramas, as well as books on popular natural history and ancient Hebrew music, but his name is best known through his 'rational stenography,' first published fully in 1860 in his *Vollständige Leitfaden*. His is the youngest of the three great rival systems in Germany—the others being those of Gabelsberger and Stolze—but

it is perhaps the most widely used, and it has been introduced into the Spanish, French, Hungarian, and Swedish languages. See WENDTLAND, *Leopold Arends und seine Schule* (Leip. 1883).

Arenicola. See SANDWORM.

Areometer, an instrument for determining specific gravity, called also the Hydrometer (q.v.).

Areop'agus, a small hill in Athens, and a famous court, so named from its meeting on the hill. See ATHENS.

Arequi'pa, a term applied primarily to a mountain in the west Cordillera of the Peruvian Andes, as also to a city at its foot, and to the southern department of Peru, which contains them both. The mountain, also called Misti, is volcanic, of the form of a truncated cone; it sometimes smokes, and has a height of 18,500 feet. Its neighbourhood is subject to earthquakes. The city, in a rich valley, 7700 feet above the sea, is the third largest in Peru, being inferior only to Lima and Callao, and contains about 35,000 inhabitants. It carries on a considerable trade both with the interior and by sea; especially since the opening of the remarkable railway from the port of Mollendo across the mountains to the Titicaca Sea, which passes Arequipa. This neighbourhood is fruitful and well cultivated. The department is bounded N. by Lima, and W. by the Pacific. It has an area of 27,744 sq. m., and a pop. (1876) of 160,282. Like nearly the whole of the maritime region of Peru, the soil is generally arid and sterile.

A'rés, the Greek god of war, or more particularly of its horror and tumult, was the son of Zeus and Hera, and one of the favourites of Aphrodite. He is represented in Greek poetry as a most sanguinary divinity, delighting in war for its own sake, and in the destruction of men. Before him into battle goes his sister *Eris* ('Strife'); along with him are his sons and companions, *Deimos* ('Horror') and *Phobos* ('Fear'). He does not always adhere to the same side, like the great *Athena*, but inspires now the one, now the other. Nor is he always victorious. Diomed, by the help of *Athena*, wounds him, and in his fall, says Homer, 'he roared like nine or ten thousand warriors together.' Such a representation would have been deemed blasphemous by the ancient Roman mind, imbued as it was with a solemn Hebrew-like reverence for its gods. The worship of Ares was never very general in Greece; it is believed to have been imported from Thrace. There, and in Scythia, were its great seats, and there Ares was believed to have his chief home. He had, however, temples or shrines at Athens, Sparta, Olympia, and other places. On statues and reliefs he is represented as young and of great muscular power, either naked or clothed with the chlamys. The Romans identified their national war god Mars with the Greek Ares. See MARS.

Are'taus, a Greek physician of Cappadocia, who flourished about 100 A.D. He is considered to rank next to Hippocrates in the skill with which he treated diseases; was eclectic in his method; and in the diagnosis of disease is superior to most of the ancient physicians. The first four books of his great work, preserved nearly complete, treat of the causes and symptoms of diseases; the other four, of the cure of the same. There is an edition by Adams (1856), and an English translation (1837).

Arethu'sa. See ALPHEUS.

Aretin'ian Syllables are the syllables *ut*, *re*, *mi*, *fa*, *sol*, *la*, used by Guido of Arezzo for the names of the notes in his musical scale. See GUIDO, SOFEGGIO.

Aretino, PIETRO, an Italian poet of the 16th century, was the natural son of a nobleman named Luigi Bacci, and was born at Arezzo, in Tuscany, in 1492. Banished from his native town, he went to Perugia, where he wrought as a bookbinder, and afterwards wandered through Italy in the service of various noblemen. At Rome, he distinguished himself by his wit, impudence, and talents, and secured even the papal patronage, which, however, he subsequently lost by writing his sixteen shameless *Sonetti Lussuriosi*. He now went to the Medicean court, where John de' Medici grew fond of him, and even procured him an opportunity of ingratiating himself with Francis I. at Milan in 1524. A few years later, he settled at Venice, where he also acquired powerful friends. The Bishop of Vicenza not only soothed the irritation of the pope against Aretino, but also recommended him to the Emperor Charles V. The latter, as well as his chivalrous rival, Francis, and other great persons, pensioned the fortunate wit, besides enriching him with splendid presents. It is said that while laughing heartily at a droll adventure of one of his sisters, he fell from a stool, and was killed on the spot (1557). His poetical works include five witty comedies and a tragedy of some merit. His satire procured for him the name of 'the Scourge of Princes;' but it seems clear that he was equally well fitted to be their sycophant. Although the very impersonation of licentiousness, he had nevertheless the impudence to publish some books of a devotional kind, with the view of obtaining the favour of the pope. Aretino's letters, and those written to him by various eminent men, contain much interesting information regarding his life and times. Nothing in the history of Italian literature is more extraordinary than that this coarse, dissolute, and comparatively ignorant man should have been praised, courted, and almost worshipped as he was. See the *Lives* of him by Charles (Par. 1873), Sinigaglia (Naples, 1882), and Samosch (Berl. 1881).

Arezzo (anc. *Arretium*), the chief city of an Italian province, is situated in a fertile valley near the confluence of the Chiana with the Arno, 38 miles ESE. of Florence. Arezzo was one of the twelve cities of the ancient Etruscans, and was famous for its pottery. It was devastated by Sulla during the Social war; was sacked by the Goths; and during the contest of the Guelphs and Ghibellines, fought stoutly for the latter, but ultimately became subject to Florence. The Piazza Grande, built by Vasari, is remarkable; the church Santa Maria della Pieve is founded on the site of a heathen temple. The Gothic cathedral (begun 1277) has a splendid high altar in marble by Giovanni Pisano; and the several churches contain fine specimens of the Tuscan school of painting. The city produces silk, and manufactures cloth, combs, and pottery; and it has a museum, library, and academy of sciences. Perhaps no city of its size has produced a greater number of celebrated men, among whom may be mentioned Petrarca; the poet Aretino; Guido of Arezzo, inventor of the musical scale; Cesalpino, the botanist; Pope Julius III.; and Vasari, author of *Lives of the Painters*. Pop. (1881) 11,816.

Argala. See ADJUTANT.

Argali (*Ovis argali*; also *Ovis ammon*), the great wild sheep of Siberia and Central Asia. It is found from Kanchatka to the Himalaya Mountains, where, however, it is only seen in the more elevated regions. 'We came suddenly,' says Dr Hooker in his *Himalayan Journal*, 'upon a flock of gigantic wild sheep, feeding on scanty tufts of dried sedge and grass; there were twenty-five of these enormous animals, of whose dimensions the term

ap gives stand as high as a calf, and have immense horns, so large that the fox is said to take up his abode in their hollows when detached and bleaching on the barren mountains of Tibet.' The horns of the male, which he uses for fighting, are nearly 4 feet long, and 14 inches in circumference at the base, where they are triangular. The general colour is dark gray, paler beneath, with a whitish disk around the tail. The wool is concealed by hair. The tail is a mere stump, an inch or so long. They are very keen-sighted, quick of hearing, and

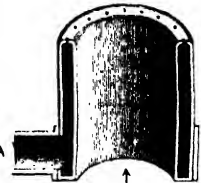


Argali Sheep.

with a delicate sense of smell; they keep persistently to one place, and are little disturbed by the natives. They have great powers of leaping, even from heights of 20 or 30 feet. A similar but smaller form is also found on the Himalaya Mountains. The White-breasted Argali (*Ovis poli*) is another closely allied form inhabiting Northern Tibet. The Rocky Mountain sheep, or Big-horn (*Ovis montana*), which is sometimes called the American Argali, has very similar characters. See SHEEP; and for details as to Argali, Prejevalsky's *Mongolia* (1876).

Argan (*Argania sideroxyylon*, *Sideroxyylon spinosum* of Linnaeus), a low spiny evergreen tree of the natural order Sapotaceae, a native of Southern Morocco, bearing an ovate drupe about the size of a plum, dotted with white, and with white milky juice. The Moors extract an oil from the fruit, which they use with their food.

Argand, AIMÉ, physician and chemist, was born at Geneva in 1755. He was the inventor of the well-known *Argand lamp*. In the ordinary oil-lamp, combustion was not complete. Argand's improvement was that he made the wick in the form of a ring. The flame thus became a hollow cylinder with a current of air ascending through the inside, so that the burning surface was doubled. It would appear, however, that the lamp did not satisfy the expectations of Argand, till his younger brother accidentally discovered the effect of a glass cylinder, as a chimney over the flame, by which the flame was steadied, a draught created, and the greatest possible amount of light yielded. Argand was soon involved in a dispute with Lauge, a Parisian, regarding the originality of his invention, but ultimately he



Argand Gas-burner.

consented to share the honour; and a French patent was obtained by Langé and Argand jointly. The French Revolution destroyed their privilege, and Argand lived for a time in England; he died in 1803. The same principle is employed in the Argand gas-burner. Gas is admitted by means of a side tube (A in the fig.) into the space between two concentric cylinders. This space is closed at the bottom, but the gas escapes at the top through a series of small openings. The air has free access to the outside of the flame, and also to the inside, since the internal cylinder is open above and below.

Argaum', a village in Berar, India, between Ellichpur and Aurungabad. Near it, on 28th November 1803, about two months after the battle of Assaye, Wellesley gained another victory over the Malhattas.

Argel, or **ARGHEL** (*Solenostemma argel*), a plant of the order Asclepiadaceæ, a native of Arabia and of the north of Africa, deserving of notice only because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery, and may readily be distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna-leaves being unequal. They are aerid, and are said to cause sickness and griping, but seem to possess little or no purgative properties.

Argelander, **FRIEDRICH WILHELM AUGUST**, an eminent astronomer, was born in 1799, at Memel. He studied at Königsberg, and was drawn to astronomy by the lectures of Bessel. In 1820 he was appointed assistant to Bessel in the Königsberg Observatory, and in 1823 chief of the observatory of Åbo, in Finland. Here he commenced a series of observations on the fixed stars which have a perceptible 'proper motion'; observations continued in a new observatory at Helsingfors, where he published a catalogue of not less than 560 stars having 'proper motions.' After removing finally to the university of Bonn in 1837, he published his *Uranometria Nova* (1843), containing celestial charts of the fixed stars seen in our hemisphere with the naked eye; also (1846) his *Astronomical Observations*, containing the results of an examination of the northern heavens from 45° to 80° declination. His *Atlas of the Northern Heavens* will combine with these works to perpetuate his memory. Argelander was long engaged in a series of observations on the changes of light in variable stars, and he also demonstrated the theory that there is a progressive motion of the solar system in space. He died 17th February 1875.

Argemone, a genus of American plants of the natural order Papaveraceæ; from the *A. mexicana*, sometimes called Mexican Poppy. A useful oil is obtained from it, and the seeds are narcotic.

Argensola, **LUPERGIO** and **BARTOLOMEO DE**, poets, styled the 'Spanish Horaces,' were born in Aragon; the former in 1564, the latter in 1565. They held in succession the post of historiographer royal of Aragon; and both spent some years at the court of the viceroy of Naples. The elder brother died in 1613, the younger in 1631. Their collected poems, first published in 1634, consist of epistles, odes, sonnets, and satires, and are imitative of the style of the Latin poets. They also published historical works.

Argent, the French word for silver, is always used in English heraldry to signify that metal. In engraving shields, it is left white.

Argenta, a town of Central Italy, 21 miles S.E. of Ferrara by rail. Pop. 3000.

Argentan, a Norman town in the French department of Orne, on the river Orne, 42 miles S.S.E. of Caen by rail. It has an ancient castle, now the *palais de justice*, and two Gothic churches. It has manufactures of linen, lace, and gloves. Pop. (1881) 5663.

Argenteuil, a town in the French department of Seine-et-Oise, on the Seine, 6 miles N.W. of Paris. Its priory, now in ruins, was founded in 656, and was by Charlemagne turned into a nunnery, of which the famous Heloise became abbess. Wine and vinegar are made here, and gypsum is quarried in the neighbourhood. Pop. (1881) 10,167.

Argentæus Codex. See UFFILAS.

Argentine (*Argentina*), a genus of small bony fishes of the family Salmonideæ. One species (*A. Yarellii*) is rarely found on the British and Northern European shores, some are North American, and two or three occur in the Mediterranean. They are chiefly remarkable for the silvery lustre of their sides, and the abundance of *mucæ* (used in making artificial pearls) with which the fibrous walls of their air-bladder are externally loaded. They are sometimes fished for the sake of this substance, and are commonly taken in nets along with anchovies or sardines.

Argentine Republic, sometimes simply called ARGENTINA, is a federal republic of South America, taking its name from the river La Plata ('River of Silver,' a misnomer). It has an area of 1,125,086 sq. m., including the unsettled territories on the north and the south, but the organised and settled provinces occupy less than one-half this area. The whole country is more than ten times larger than Great Britain and Ireland taken together. The republic is made up of fourteen provinces and a number of territories as follows: (1) The coast provinces of Buenos Ayres, Santa Fé, Entre-Ríos, and Corrientes; (2) the Andean provinces of La Rioja, Catamarca, San Juan, and Mendoza; (3) the central provinces of Córdoba, San Luis, Santiago del Estero, and Tucumán; (4) the northern provinces of Salta and Jujuy; (5) the territory of the Pampa; (6) the territories of Neuquén, Río Negro, Chubut, Santa Cruz, and Tierra del Fuego in the south (these together comprising the greater part of what is known as Patagonia); and (7) the northern territories of Misiones, Formosa, and Chaco. On the west, the Andes divide this republic from Chili; Bolivia bounds the country on the north, while Paraguay, Brazil, Uruguay, and the Atlantic Ocean form the eastern limit. The great island-group of Fuegia, on the south, belongs partly to this republic and partly to Chili.

The physical features of the country are easily described; except for the sub-Andean foot-hills, and a few other local and unimportant hilly or mountainous tracts, nearly all the country consists of vast plains or pampas. The northern plain region (the Chaco) is in part densely wooded; but most of the Pampas country is open, presenting wide ranges of treeless pasture, varied by patches of huge thistles and other coarse plants. In the Patagonian region there are extensive districts completely covered with stones and shingle, interspersed with clumps of thorny brushwood, and having in the hollows many strongly saline ponds or lakes.

The native animals include the guanaco, the fox, the skunk, the chinchilla, the nutria, the biscacha, and various species of ant-eater, armadillo, deer, and peccaries. Thousands of wild cattle and horses, descendants of stock of Spanish importation,

inhabit the remoter districts; but the systematic pasturage of live-stock (the main industry of the country) is reducing the range of the wild cattle. Bird-life is singularly rich and varied. The rheu nandu, or American ostrich, is one of the most remarkable species. Humming-birds, parrots, and flamingos are among the conspicuous birds.

The climate in the extreme north is very hot, for it lies north of the tropic of Capricorn. The more remote southern territories have an extremely bleak, windy, and disagreeable climate, but are not really so cold as might be expected from their relatively high latitude. But the country in general enjoys an equable, temperate, and healthful climate. The littoral region is subject to high winds, called *pamperos*, which often extend far out to sea. The people of the country are mostly Spanish in their language and descent, but there are many Italians, French, and other European immigrants. The *Gauchos*, or herdsmen of the plains, are a hardy and spirited, but ignorant race, often of partial Indian descent. Some of the Indians of the remote districts have become skilled in the rearing of flocks and herds. Agriculture has of late been rapidly extended. Wheat, maize, flax, and linseed are exported; but the chief staples of export are skins, hides, hair, bones, bone-ashes, horns, phosphorus, ostrich-feathers, wool, tallow, dried and salt beef, beef-extract, fresh meat (frozen), and live animals. The recent great extension of the railway lines has done much to develop the country. The greater part of the republic is well watered and highly fertile, but there are extensive regions of waste land. The various fruits of European culture all find the conditions for growth in this country. The imported vine and the apple-tree in some places have so spread that they form great thickets, and afford much food even to the wild tribes of the southern territories. Sugar-culture thrives in the NW. and north. Wines, spirits, and dried fruits are extensively produced; a valuable product of the north is *maté*, or Paraguayan tea.

The mineral resources of the country are comparatively undeveloped. In the sub-Andean regions, chiefly to the NW., some gold, copper, lead (said to be valuable), and silver are obtained. Salt, iron, alum, lime, marble, cement, and coal, are among the minerals of the country. Rich deposits of gold are reported to occur in Patagonia.

The principal seaport is Buenos Ayres, the capital and largest city. Situated on the great La Plata estuary, its commerce has been hindered by the shoalness of its water-approaches; but extensive engineering works have in part overcome the difficulties of navigation. The Patagonian coast has many large bays, but is very dangerous, and is also deficient in good harbour facilities. The rivers Paraná and Uruguay, with their large tributaries, are important channels of trade. The principal articles of manufacture are cattle-products, sugar, spirits, flour, furniture, &c. The manufacturing industries are receiving much attention. The population of Buenos Ayres in 1886 was 398,498. Among the other large towns are Córdoba (50,000), Rosario (45,000), La Plata (26,000), Mendoza, Tucumán (26,000), Corrientes, Santa Fé, Gualeguay, Gualeguaychén, Paraná, Salta, San Juan, San Nicolás, and Santiago. Rosario de Santa Fé, Corrientes, and Paraná are important river-ports, and the first-named has a very large trade. Ensenada (adjoining the town of La Plata) and Bahía Blanca are seaports of rising importance. The nearly completed Trans-Andean railway will probably divert much of the direct trade of Chili to Argentine ports. At present there is very little trade and not much overland communication with Chili, owing to the difficulty of crossing the high

intervening mountain-ridges. The commerce of the country is very largely with Great Britain and France. France purchases over one-fourth of all the Argentine exports, and Britain takes about half as much of the exports as France. But of the Argentine imports, nearly 40 per cent. is received from Great Britain. The United States have only a very limited direct commerce with the Argentine republic.

The Roman Catholic is the established religion, but others are tolerated. Education is provided for by law, and many schools are sustained at public cost; among them being normal, mining, agricultural, and training schools. There are universities at Buenos Ayres and Córdoba, and connected with the latter is the national astronomical observatory.

The population of the country in 1869 was 1,736,922; in 1882 it was officially estimated at 2,942,000 (less than 3 to the square mile), of whom 1,907,000 were Argentines, and no fewer than 339,000 of Italian birth, 161,000 Spanish (very many of whom are Basques), 153,000 French, 51,000 English, and 54,000 German and Swiss. The large number of Italians is a conspicuous feature of the population. Much of the increase is due to immigration, nearly 400,000 immigrants having entered the country in the five years, 1881-86; of whom 70 per cent. were Italians, 10 per cent. Spaniards, and 8 per cent. French.

The government is closely modelled upon that of the United States. In the executive, legislative, and judicial departments alike, is this resemblance very conspicuous. The total debt of the republic amounts to more than £42,500,000; and loans have also been negotiated by several of the provinces separately. The budget for 1887 showed an estimated income of £9,700,000, and an expenditure of £9,475,000; but for some years past the annual expenditure has exceeded the annual revenue. The army and navy are recruited by voluntary enlistment. In 1886 the army strength was 8720, including a large proportion of officers; and the national guard was returned at 347,653. The navy included 3 ironclads, 6 gunboats, 8 torpedo boats, all of good classes, and over 20 other steamers, mostly of a small size.

In 1886 the length of railway lines open for traffic was 3350 miles (extending from Buenos Ayres to Mendoza, with a projected extension across the Andes to meet the Chilean railways, and to Tucumán), and 815 miles more were in course of construction. Above 15,000 miles of telegraph-wires stretched through the country, and over them about 600,000 messages passed within the year. There are about 600 post-offices, and the service in 1885 carried over 20,000,000 letters, and 15,000,000 newspapers.

The river La Plata was visited by the Spaniards in 1516, and the country was colonised in 1535, when Buenos Ayres was founded. For many years the country was regarded as a part of Peru. The progress of the colony was not more hindered by the bloody wars which prevailed with the natives for a hundred years, than by unwise legislation at Madrid. In 1776 Buenos Ayres became the capital of a new vicereignty. In 1806 that capital was occupied by a British force under General Beresford, but the town was soon besieged and compelled to surrender. In 1808 the British forces under Whitelock assaulted the town, but after very severe loss, were themselves compelled to capitulate. In 1810 the colonists founded a local provisional government. A sanguinary war for independence followed, which did not cease till 1824. Spain acknowledged the independence of the country in 1842. The first half-century of Argentine autonomy was much disturbed by revolutions. The Brazilian-Argentine war against

Paraguay (1865-70) was interrupted and followed by renewed revolts at home. But latterly the great material progress of the country has been accompanied by an equally remarkable movement in favour of stability of government and the repression of factions. The policy of the government towards agricultural immigrants is highly liberal. An interesting colonial experiment has resulted in the establishment of the town and territory of Chubut, in Patagonia, peopled mainly by Welsh settlers. No other South American country has made such widespread and rapid improvement as this. See Muhlhall, *Handbook of the River Plate* (1884); M. F. Paz Soldan, *Geografía Argentina* (1885); Lady F. Dixie, *Across Patagonia* (1880); G. Bove, *Patagonia Terra del Fuego* (1883); and the recent British and American *Consular Reports*, some of which are full of important and interesting information.

Arges, a genus of small bony fishes belonging to the family Siluridae. They are found in mountain-lakes among the volcanoes of the Andes, which lie in some cases 10,000 feet above the level of the sea. During volcanic eruptions these fishes are cast in such extraordinary numbers over the soil that they sometimes cause disease among the inhabitants. According to Humboldt's account (1805), they are ejected along with torrents of hot muddy water from the craters and sides of the volcanoes, at an elevation of 16,000 feet above the sea. The form which he described he called *Pimelodes cycloptum*, but the two or three species now known are referred to the genus *Arges*. The local name is *Pecudiilla*. *Brontes* and *Astroblepus* are closely allied genera. Humboldt's account of their ejection has been accepted, but renewed observations as to the exact habitat of the fishes are desirable.

Argile Plastique, a series of beds near the base of the Eocene system in France. They consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. Marks occur, including, in some places, the fluviatile shells that are met with in the same position in the London basin, and in others, large numbers of a species of oyster. Beds of impure lignite (*Liguetes du Soissonais*) also occur.—The argile plastique is the equivalent in the Paris basin of the Woolwich and Reading series of the Eng. geologists. See Eocene.

Argillaceous Rocks. All rocks composed entirely or to some extent of clay are included under this title. Pure clay is known as *kaolin* or *porcelain clay*. It is a hydrated silicate of alumina. Decomposed felspar, from which the silicates of potash, soda, &c. have been washed out, supplies the material which forms kaolin. *Common clay*, however, contains many impurities; the chief are sand, in variable proportions, and oxide of iron, which gives it colour to the mass. Any matter that contains sufficient alumina (more than 10 per cent.) to enable it to retain its shape when moulded and pressed, is called clay. Plastic clays occur abundantly in the superficial deposits and in the Tertiary strata. The older clays become more or less indurated; many, however, are plastic. The carboniferous strata yield *fireclays*, which are much used for the manufacture of brick for ovens, furnaces, &c. When indurated argillaceous rocks are regularly laminated, and split into thin layers in the direction of the laminae, they are called *shale*. In *clay-slate*, the clay has become highly indurated and metamorphosed, so as to split into plates that are altogether independent of the original lamination, and frequently cross it at right angles.

Argol is a crude variety of cream of tartar which forms a crust in the interior of wine-vats

and wine-bottles. Originally, it exists in the juice of the grape, and is soluble therein; but during the fermentation of the juice, and as it passes into wine, much alcohol is developed, which remaining in the fermenting liquor, causes the precipitation of the argol; the latter being very sparingly soluble in an alcoholic liquid. Some wines, when they are bottled, are not fully ripe, and more alcohol being thereafter developed, a further precipitation of argol takes place as a crust in the bottles, and hence the meaning of the term *crusted port*. Argol is generally of a reddish tinge, obtained from the colour of the grapes, but sometimes is of a grayish-white colour, when it has been deposited during the fermentation of the juice of colourless grapes. The red or white argol is denominated in commerce *crude tartar*, and its principal uses are in the preparation of Cream of Tartar and Tartaric Acid (q.v.). The constituents of argol are bitartrate of potash (cream of tartar), tartrate of lime, with colouring and extractive matters.

Argôlis, the north-eastern peninsula of the Morea of Greece, lying between the Bays of Nauplia and Egina. Together with Corinth, it forms one of the thirteen provinces of the kingdom of Greece, with an area of 1442 sq. m., and a pop. (1879) of 136,081. Its capital is Nauplia. The plain of Argos, famous in ancient times for its breed of horses, is naturally fertile, but is now made pestilential by morasses. It is the most extensive in the whole peninsula, being 12 miles in length and 5 in breadth. Here was the Lernean marsh of antiquity. It is surrounded by an eastern continuation of the range of mountains on the north of the Peloponnesus, which also girds the river and shattered looking coast. The highest summits attain an elevation of between 5000 and 6000 feet.

The modern town of Argos is built on the site of the ancient city, 7 miles from Nauplia. It has still remains of its cyclopean walls, as well as of a grand rock-hewn amphitheatre. Cotton, vines, and rice are grown. Pop. (1879) 9861.

By Argos, Homer frequently means the whole Peloponnesus, the most important part of Greece; hence the Greeks collectively are often styled Argives. The same name, however, he applies to Agamemnon's own kingdom of Argos, of which Mycenæ was the capital, and to the city of Argos itself. Herodotus applied the name Argolis to the district of Argos; and later under the Romans, Argos meant only the town, Argolis the district; but the latter name included a much wider territory than the Argos of Greek independence, which meant merely the country lying round the Argolic Gulf.

The ancient capital, Argos, was situated about 3 miles from the sea, and was considered the oldest city in Greece. Supposed to have been built by Inachus, or by his grandson Argus, it was a famous city during the mythical ages; and when it may be said to appear first in history, about 750 B.C., we find it, under its ruler Phidon, the chief state of Peloponnesus. Latterly, Sparta robbed it of its supremacy and influence. It sided with Athens in the Peloponnesian war, joined the Achaean League in 243 B.C., and became part of the Roman province of Achaia in 146. The city was specially noted for its worship of Hera. It has one of the most famous of the ancient schools of statuary, and its natives were renowned for their love of music; but few poets, and no orators or philosophers, were born amongst them.

Argonaut. See NAUTILUS.

Argonauts, heroes of Greek Mythology (so named from their ship *Argo*), who undertook a long voyage into unknown seas, under the command of Jason. The story is alluded to in the

Odyssey, and is related by Hesiod, and, among later writers, with great fullness by Apollonius Rhodius and Apollodorus, but the discrepancies are numerous and irreconcilable. The common story is as follows: In Iolcus, in Thessaly, reigned Pelias, who had unjustly taken the crown from his half-brother Æson. In order to get rid of Jason the son of Æson, the usurper commissioned him to fetch from the country of Æetes (Colchis) the golden fleece of the ram which had carried Phrixus in safety through the air. The ram had been the gift of Hermes; and Phrixus, after reaching Colchis safely, sacrificed it to Zeus, and gave the fleece to Æetes, who hung it up in the grove of Ares, on an oak-tree guarded by a sleepless dragon. Jason therefore caused Argus, the son of Phrixus, to build a ship of fifty oars; and for this adventure gathered together the bravest heroes from all parts of Greece, fifty in number, with whom he sailed. Their first landing-place was Lemnos, which they found inhabited entirely by women who had slain all their husbands. They were kindly received, and admitted to the closest intimacy. Next they sailed along the coast of Thrace, up the Hellespont to the Doliones, and were hospitably received by King Cyzicus, who was afterwards accidentally killed by Jason. After landing at Mysia, where they left Heracles and Polyphemus—who had wandered too far inland in pursuit of the lost Hylas—they came to the country of the Bebrycæ, whose king, Amycus, was killed by Pollux in a boxing-match. They next sailed along the coast of Thrace to Salmydessus, where the blind seer, Phineus, was tormented by the Harpies. Zetes and Calais, the two winged sons of Boreas, having delivered him from them, the aged prophet forewarned them of the dangers of the voyage and the precautions they should adopt, and especially warned them against the dangerous passage between the terrific rocks, the Symplegades, which alternately opened and shut so quickly that even a bird could scarcely pass safely through. When the *Argo* arrived at this place of danger, Euphemus let loose a dove in order to judge from its fortune what they themselves might expect. The bird escaped with the loss of its tail. The mariners resolved to risk the passage, and after rowing with all their might, while the powerful arms of Athena held the rocks asunder for a moment, got safely through, their ship only losing some of the ornaments of its stern.

Halting a while on the coast of the Mariandyni, where the seer Idmon and the helmsman Tiphys died, they sailed along the coast till they arrived at the mouth of the river Phasis, in Colchis. Here King Æetes promised to give up the golden fleece to Jason, on condition that the latter should yoke to a plough two fire-breathing bulls with brazen hoofs, and should sow the dragon's teeth not already sown by Cadmus in Thebes. Jason, by the help of the famous sorceress Medea, daughter of Æetes, who had fallen passionately in love with the bold navigator, fulfilled these conditions; and was also assisted by Medea in still more wonderful exploits. He obtained from her, under promise of marriage, a charm against fire and steel, and was enabled to destroy all the warriors who sprang up from the land sown with the dragon's teeth. While Jason was engaged in this task, Æetes formed a plan to burn the ship *Argo*, and put the crew to death; but Jason, informed of the scheme by Medea, anticipated it, hastened into the grove, stupefied the dragon-sentinel by an opiate charm prepared by Medea, seized the golden fleece, and, embarking in the *Argo* with his mistress and her brother Absyrtus, sailed away from Colchis by night. Æetes followed, but before he overtook them, Medea slew her brother Absyrtus, and cut him into several pieces, which she threw overboard, one

at a time. While King Æetes stayed to gather up the fragments, he gave Jason time to escape from the pursuit. The Argonauts now reached the mouth of the river Eridanus, but were driven on the Absyrtian Islands by a storm sent from Zeus, who was angry on account of the murder of Absyrtus. Meanwhile the mast of the *Argo*—which had been cut from the sacred grove of Dodona—delivered an oracle to the effect that Zeus could not be appeased unless they sailed towards Ansonia, and were purified through the expiatory agency of Greece. This was accomplished; and next the mariners passed by the Sirens, from whose charms they were preserved by Orpheus, who sang to them, but could not hinder one of their number, Butes, from swimming off to the sea-maidens; then through Scylla and Charybdis, by the help of Thetis, and at length landed on the island of Coreycra, where Aleinous ruled. On leaving this place, they encountered a storm at night, but were saved by Apollo, who in flashes of lightning revealed to them the haven of Anaphe, where they raised an altar to their preserver. At Crete, their landing was opposed by the brazen giant Talus, who was slain by the artifices of Medea. They subsequently touched at Ægina, and sailing between Eubœa and Locris, arrived safely at Iolcus. Jason dedicated the good ship *Argo* to Poseidon, at the Isthmus of Corinth.

Such is the epic and localised Greek form of a story more widely diffused than perhaps any other. It is an arrangement with local and quasi-historical features of a number of incidents common not only in European but in savage folk-lore. Grote dates the poetic elaboration of the story between 600 and 500 B.C. The situation from which the story starts is a familiar commonplace in folk-tales: a child in danger at home* of being eaten, sacrificed, cheated of his birthright, or at least oppressed by a cruel stepmother, escapes by means of a gifted animal. Further common features are the attempt to evade prophecy, the arrival of the true heir, the endeavour to get rid of him by sending him on an impossible adventure, on which he starts accompanied by friends endowed with marvellous powers. The hero comes to the house of a powerful and malevolent being, becomes the lover of his daughter, and performs by her aid the impossible tasks imposed. The pair fly, throwing behind them in their flight various objects to detain the pursuer, often a comb which grows into a forest, or the like. How closely Jason's corresponds to the common story is at once obvious. He is the typical adventurer; his Argonauts are endowed with the usual supernatural powers of seeing, hearing, flying; the powerful and malevolent being is King Æetes; the daughter who falls in love with the adventurer, Medea. Mr Lang has collected variants of the story from Samoyed, Epirot, Kaffir, Malagasy, Algonquin, Gaelic, Norse, Russian, Italian, Japanese, and Samoan sources. This is not the place to discuss the question whether the same romantic series of incidents were invented through mere accidental coincidence by such widely different races, or whether the story, once known, drifted all round the world. But the fact of the universality of the story makes it unnecessary to discuss the rationalising of Greek geographers and historians like Strabo and Arrian. It is as idle to linger over the explanations of Sir George Cox and his school, discredited as these are by their own differences. Jason may be 'the violet-tinted morning from which the sun is born,' 'the far-darting ray of the sun' himself, or 'the spring with its soft suns and fertile rains;' while Medea may represent the dawn, the moon, or a lightning goddess, as the reader pleases. See Grote's *History of Greece*, vol. i.; 'A Far-travelled Tale' in Lang's *Custom and Myth* (1884); and Lang's Introduction

to Mrs Hunt's translation of Grimm's *Household Tales* (1884).

Argos. See ARGOLIS.

Argostoli, a seaport of the Ionian Islands, the capital of Cephalonia, is the seat of a Greek bishop, and has a good harbour, with quays a mile in length. It was almost destroyed by an earthquake in 1867. Near it are the 'sea-mills of Argostoli,' two holes in the rocky coast, into which the sea pours with a force sufficient to drive two mills, and disappears, to return, most likely, through brackish springs. Pop. 7871.

Argot. See SLANG.

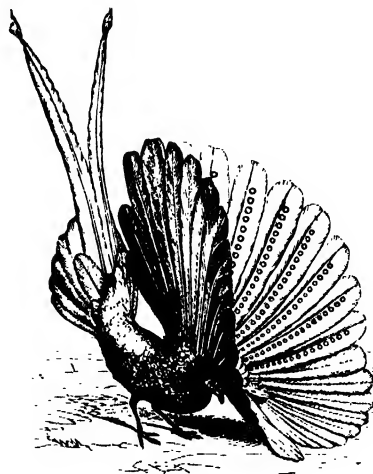
Arguelles, AUGUSTIN, born in Asturias in 1776. On the outbreak of the War of Independence (1808), he attached himself to the patriotic party, and as representative of his native province in the cortes, gained a high reputation for eloquence (1812-14). On the restoration of Ferdinand VII., Arguelles was arrested, and suffered ten years' barbarous captivity, till the revolution of 1820 restored him to freedom. For a few months he was Minister of the Interior, but on the fall of the constitution (1823) he fled to England, where he remained till the amnesty of 1832. On his return to Spain, being nominated to the cortes, he was repeatedly made president and vice-president of the Chamber of Deputies, and always showed himself a moderate but unwavering reformer. He died at Madrid, March 23, 1844.

Argument (Lat. *argumentum*), in Logic, means properly the ground or premiss on which a conclusion is rested; popularly, it is applied to a series of arguments, or to a controversy. Logicians have given distinctive names to various kinds of arguments. The *argumentum ad hominem* is no real proof, but only an appeal to the known prepossessions or admissions of the persons addressed. The *argumentum ad veritatem*, again, has no regard to anything save objective truth. The *argumentum a consensu gentium*, is an appeal to the common belief of mankind. A good example of this is the well-known proof of the truth of Catholic doctrine: *Quod semper, quod ubique, quod ab omnibus*. The *argumentum a baculo*, the use of the cudgel, is concise in its style, and has settled many controversies.

Argus, the son of Zeus and Niobe, third king of Argos, which took from him its name. —ARGUS, son of Aegenor, or of Inachus, surnamed Panoptes ('all-seeing'), had one hundred eyes, some of which were always awake. Hence Hera appointed him to watch over the cow into which Io had been transformed. Hermes being commissioned by Zeus to carry off the cow, slew Argus by stoning him; or, as Ovid says, first charmed him to sleep by playing on the flute, and then cut off his head. Hera put his hundred eyes in the tail of the peacock, her favourite bird. —ARGUS, the builder of the ship *Argo* (see ARGONAUTS).

Argus, a genus of gallinaaceous birds, remarkable for magnificence of plumage. The only known species is *Argus gigantens*, formerly called *Phasianus Argus*, and still very generally the argus pheasant. The bill is nearly as long as the head; the sides of the head and of the neck are almost destitute of feathers; the tail consists of twelve feathers, of which the two middle ones in the male are very much elongated, and the secondary feathers of the wings are much longer than the primary. The name argus has allusion to the many beautiful eye-like markings which adorn the plumage of the male, and particularly the secondary wing-feathers. The primary feathers are also exquisitely marked. The ornaments are hidden except when the male shows himself off to

his mate. 'He then erects his tail, and expands his wing-feathers into a great, almost upright circular fan or shield, which is carried in front of the body. The neck and head are held on one side,



Argus Pheasant (from Darwin).

so that they are concealed by the fan; but the bird, in order to see the female before whom he is displaying himself, sometimes pushes his head between two of the long wing-feathers, and then presents a grotesque appearance.' The marvellous decoration, according to Darwin, serves solely as a sexual charm, and the development of the ball-and-socket or eye-like markings, which he has shown to be connected by a perfect series of gradations with the simple spots, affords beautiful illustration of variation associated with *Sexual Selection* (q.v.). The decorative development seems really to have gone too far, for the size of the secondary wing-feathers is said almost to deprive the male bird of the power of flight. The female is of comparatively tame plumage, not only wanting the eye-like markings, but also the great length of the secondaries and of the middle tail-feathers. The size of the bird, when divested of its plumage, is not much greater than that of a common barn door fowl; but the total length of the male, including tail-feathers, is over 5 feet, and the secondaries alone may be almost 3 feet long. The argus is a native of Sumatra and other eastern islands, of the peninsula of Malacca, Siam, &c. It is said to be found even in the northern parts of China. It is impatient of confinement, and has very seldom been brought alive to Europe. See Darwin, *Descent of Man*.

Argyll, ARCHIBALD CAMPBELL, MARQUIS OF, was the descendant of Sir Colin Campbell of Lochow or Loch Awe, who was knighted in 1286, and who through his prowess bequeathed to the chiefs of his line the Gaelic title of Mac Caillean Mhor or Mac Callum More ('great Colin's son'). Sir Duncan Campbell of Lochow was raised to the peerage as Lord Campbell in 1445; and Colin, his son, was created Earl of Argyll in 1457. The second earl fell at Flodden (1513); the fourth, who died in 1558, was the first of the Scottish nobility to embrace the Reformation principles; and the fifth (1530-73) figured prominently in Mary's reign, first as a Lord of the Congregation, and next as an adherent of the queen. ARCHIBALD was born in 1598, and in 1619, his father having turned Catholic and quitted Scotland, became the sole potentate of all the broad lands of his line.

He succeeded as eighth earl in 1628. Already he had given proofs of that strength of religious principle which marked his whole life, and of a perilous union of attachment to the king and of faith in the principles against which the king made war. In the General Assembly at Glasgow (1638), he openly took the side of the Covenanters, and next year he joined Leslie's encampment on Duns Law. In 1640 he marched with 4000 men through Badenoch, Athole, Mar, and Angus, enforcing subjection to the Scottish Parliament. Charles, on his visit to Scotland in 1641, found it expedient to show peculiar favour to Argyll, and raised him to the dignity of marquis. In 1644 he dispersed the royalist forces under Huntly; but he was less successful in withstanding the genius of Montrose, who in 1645 annihilated his army at Inverlochy. His estates had suffered so much from Montrose's ravages, that in 1647 £40,000 of the public money was voted for the support of himself and his clansmen. He was strongly opposed to the execution of the king; and in 1651 he crowned Charles II. at Scone, having previously made overtures to marry him to one of his own daughters. After the defeat of Worcester, he defended himself for nearly a twelvemonth, in his castle of Inveraray, against Cromwell's troops; but in 1652 he gave in his submission to the Protector. On the Restoration, he repaired to Whitehall, encouraged by a letter from his son; but he was at once arrested, and committed to the Tower. Thence taken by sea to Leith, he was brought before the Scottish Parliament on fourteen charges of compliance with the usurpation. He defended himself with spirit, but in vain; and on 27th May 1661 he was beheaded with the 'maiden' at the cross of Edinburgh—having displayed throughout his trial, and on the scaffold, the dignity of a true nobleman, and the meekness of a Christian. Hostile views have been taken of his character, not the most favourable being Scott's in the *Legend of Montrose*; and one point is certain—he was a coward in the field.—His son, ARCHIBALD, 9th Earl of Argyll, exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the royalist side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to Cromwell, that he was specially excepted from the act of grace in 1654. Acting under Charles's orders, he submitted next year to the Protectorate; but from 1657 to 1660 he was a prisoner. On the Restoration, he was received into high favour (as a balance to the execution of his father), and unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish legislature. Thus, in 1681 he voted in council against Donald Cargill, and signed a letter upholding the divine right in its extremest form; yet, the same year, would only sign the new test with a reservation, which led to his trial for 'leasing-making,' and his condemnation to death. The devotion of his step-daughter enabled him to escape from Edinburgh Castle in the disguise of a page; and after remaining some time in concealment, he fled to Holland. Landing in Argyllshire, in May 1685, with an armed force, to co-operate in Monmouth's rebellion, he was, after a series of misfortunes, taken prisoner, and beheaded at Edinburgh, on his former sentence, 30th June 1685.—His son, ARCHIBALD, an active promoter of the Revolution, was created Duke of Argyll in 1701, two years before his death.—His son, JOHN, 2d Duke of Argyll, was born in 1678. Destined, says Pope, 'to shake alike the senate and the field,' he as royal commissioner in 1705 had a principal share in bringing about the Act of Union; whilst as a soldier, from 1694 he distinguished himself under Marlborough

at Ramillies, Oudenarde, and Malplaquet. Previous to the change of ministry in 1710, Argyll had been a keen Whig. He now veered with the wind of the court, and became a declaimer against Marlborough. For reward he was appointed by the Tories generalissimo of the British army in Spain; but considering himself to have been unhandsonely treated by the ministry, he shortly after returned, and finding his influence greatly diminished, again turned Whig. His tortuous career up to the '15 seriously detracts from his meritorious services during that critical period, which in 1718 gained him the English title of Duke of Greenwich. His restless vanity and ambition, however, constantly prompted him to political intrigues. In 1721 he again played into the hands of the Tories, for the purpose of securing the entire patronage of Scotland. In 1737 he rose into immense popularity in his own country, by his spirited defence before parliament of the city of Edinburgh in regard to the Porteous mob. He died 3d September 1743. He was a man of lax principles and selfish character, but possessed of considerable shrewdness and talent, and noted for a kindliness and courtesy in private life, which procured him the title of 'the Good Duke of Argyll,' and which are commemorated in Scott's *Heart of Midlothian*.—GEORGE JOHN DOUGLAS CAMPBELL, 8th Duke of Argyll, was born in 1823, and succeeded his father in 1847. At the age of nineteen, he wrote *A Letter to the Peers from a Peer's Son*, on the struggle which ended in the disruption of the Scottish Church; and seven years later appeared his *Presbytery Examined*, a historical vindication of the Presbyterian system. He was Lord Privy Seal (1853-55; 1859-66) and Postmaster-general (1855-58) under Lord Palmerston. Under Mr Gladstone he was Secretary of State for India (1868-74), and Lord Privy Seal (1880-81). He resigned the last office, disapproving of the Irish Land Bill. His works include, besides numerous papers on zoology, geology, &c., *The Reign of Loos* (1866); *Primer of Man* (1869); *A History of the Antiquities of Iona* (1870); *The Eastern Question* (1879); *The Unity of Nature* (1884); and *Scotland as it Was and as it Is* (1887).—His eldest son, JOHN DOUGLAS SUTHERLAND CAMPBELL, Marquis of Lorne, born in 1845, in 1871 married the Princess Louise, and from 1878 to 1883 was Governor-general of Canada. He is author of *A Trip to the Tropics* (1867); *Guido and Lila* (1875), &c.

Argyllshire, or ARGYLLSHIRE, a county in the west of Scotland, cut up into many peninsulas by arms of the sea, and including numerous islands. Its greatest length is 115 miles; greatest breadth, 55; and its extent of coast-line was ascertained by the Admiralty survey to be as much as 2289 miles, owing to the indentation of the coast by numerous sea-lochs. Next to Inverness, it is the largest county in Scotland, its area being 3213 sq. m., of which 623 belong to the islands. No part is more than 12 miles from the sea or from large inland lochs. The chief islands are Mull, Islay, Jura, Tyree, Coll, Lismore, and Colonsay, with Iona and Staffa. The general aspect of Argyllshire is wild and picturesque, the northern part being everywhere mountainous, and presenting some of the grandest scenery in Scotland, as Glencoe. The highest peaks are Bidean nam Bian (3766 feet) and Ben Crnachan (3689). The chief sea-lochs are Lochs Moidart, Smalt, Linnhe (branching off into Lochs Leven and Eil), Fyne, and Long. The streams are short and rapid, the principal being the Orchy, running through Glenorchy into Loch Awe, and the Awe connecting that lake with Loch Etive. The fresh-water lochs are Loch Awe and Loch Lydoch, the latter on the Perthshire border. The

rocks of Argyllshire are mica-slate, which predominates on the mainland; trap in Mull and Lorne; quartz rock in Islay and Jura; granite around Lochs Fyne and Etive; patches of lias and oolite in many of the isles; and a little old red sandstone west of Loch Fyne and in South Kintyre. Lead has been mined at Strontian (where the mineral Strontianite was discovered), at Tyndrum, and in Islay and Coll. A copper mine exists in Islay. The Easdale and Ballachulish quarries supply the best roofing-slates in Scotland. Coal occurs near Campbelltown; fine marble in Tyree, &c.; excellent granite near Inveraray; and limestone in most parts of the county. The fertile parts of Argyllshire lie along the arms of the sea and the streams. The soil is mostly a light, sandy, and gravelly loam along the coast and the sides of rivers, and gravelly, with a till bottom, on the hillsides. Whereas the total percentage of cultivated area in England is 79.3, and in all Scotland 23.5, in Argyllshire it is only 5.7. Sheep and cattle rearing is the chief occupation of the farmer, more sheep (in some years upwards of a million) being reared in Argyllshire than in any other Scotch county. Argyllshire abounds in deer and game. Loch Fyne is famed for its herrings. Loch Awe abounds in salmon and trout. In many parts of Argyllshire the peasantry are still very poor, notwithstanding that steamers now connect every portion of the coast with Glasgow, and that a railway to Oban was opened in 1880. A bill for a railway to connect the Clyde Valley with Ardrishaig and Crinan was passed in 1887. The kelp industry, introduced into Tyree in 1746, had become all but extinct in 1863, when it was partially revived. The manufactures are unimportant, the chief being whisky, in Campbelltown and Islay, and coarse woollens for home use. The principal towns and villages are Inveraray, Campbelltown, Oban, Dunoon, Lochgilphead, Tarbert, and Tobermory. The first three unite with Ayr and Irvine in returning one member to parliament; the county returns another. Pop. (1831) 100,973; (1881) 76,440, of whom 46,503 were Gaelic-speaking. The decrease is chiefly due to emigration. The principal proprietors are the Duke of Argyll and the Earl of Breadalbane. Among the antiquities of Argyllshire are the ecclesiastical ruins of Iona and Oronsay, and the castles of Dunstaffnage, Duolly, and Kilehrn. See Lord Archibald Campbell's *Records of Argyll* (Edin. 1886).

Argyrokastron (the Turkish *Eğeri*), a town of Albania, in the province of Janina, near the Dnyo, an affluent of the Viosa. It contains the ruins of an imposing castellated fort. In 1814 the town was almost depopulated by the plague, and the population has never since exceeded 5000, being now about 4000.

Argyropoulos, (1) JOANNES, one of the earliest teachers of Greek learning in the West, born at Constantinople in 1416, settled finally in Italy after the fall of his native city in 1453. He taught first at Florence, and here among his pupils were the son and grandson of Cosmo de' Medici; but on the outbreak of the plague in 1471 he repaired to Rome, and there he died, probably in 1486. From his school came many learned men, among them Poliziano and Rucellin. — (2) PERIKLES, a Greek publicist, born September 17, 1809, at Constantinople, became professor of Jurisprudence at Athens in 1837, and soon made himself more notable than popular with the court party as a promoter of constitutional state reform in Greece, especially through his journal *Anamorphosis*. Elected to the Chamber in 1843, he was foreign minister from May 1854

to September 1855, when he returned to his academic chair. He died December 22, 1860.

Aria (Ital. 'air'), in Music, a rhythmical melody, as distinct from recitative. The term was formerly applied to a measured lyrical piece either for one or several voices; but is now commonly applied to a song introduced in a cantata, oratorio, or opera, and intended for one voice supported by instruments. The 'aria grande' has taken many forms, mostly of two classes—the aria with 'da capo,' in which the first section is repeated *in extenso* after the second or intermediary one, and the aria without 'da capo,' a more varied and extended form, in which the first section may be several times repeated, and the last time generally more or less expanded into a coda. The great masters have raised it to almost symphonic importance—e.g. Beethoven's 'Ah perfido,' or Mendelssohn's 'Infehee.'—**ARIETTA** is a short melody.

Ariadne, daughter of Minos of Crete and Pasiphaë. She fell in love with Theseus when he came to Crete with the annual tribute of the Athenians for the Minotaur, and gave him a sword with which to slay the monster, and a clew by means of which to find his way out of the Labyrinth. For this service Theseus promised to marry her, and she escaped with him, but was slain by Artemis on the island of Naxos. Such is the account of Homer, but according to a more common tradition, she was deserted by Theseus at Naxos, where she was found by Dionysus returning from his triumph in India. The youthful god was captivated by her beauty, and married her. At her death he gave her a place among the gods, and hung her wedding crown as a constellation in the sky. Ariadne, as left forsaken by Theseus and found by Dionysus, has been a favourite subject for works of art.

Aria'no (*Aranum*), a city of South Italy, in the province of Avellino, beautifully situated 2800 feet above the sea, in one of the most frequented passes of the Apennines, 84 miles N.E. Naples by rail. It has a fine cathedral. Po (1881) 12,522.

Arians. See **ARIES**.

Arias Montanus, BENEDICTUS, a Catholic divine and learned orientalist, was born in 1527, in the south Estremadura. He studied at Seville and Alcala, and became a Benedictine. He was present at the celebrated Council of Trent; and in 1568 was sent by Philip II. to Antwerp, to superintend the publication of the famous edition of the Antwerp Polyglot Bible (8 vols. folio, 1569-72). He became librarian at the Escurial, and died in 1598.

Arica, a seaport of Tacna, the most southerly department of Peru. It is one of the chief outlets of the trade of Bolivia, and has been connected since 1854 by rail with Tacna, 38 miles inland. Its exports mostly consist of copper, silver, cascarilla and other barks, chinchilla skin, alpaca, and vicuña wool. Arica has frequently suffered from earthquakes. It was almost wholly destroyed in 1832, but soon rebuilt. It suffered severely again in 1868, the earthquake being succeeded by fearful waves, one of them 40 feet high. In the time of the Spanish supremacy, Arica was a great commercial city with 30,000 inhabitants; its present pop. is about 4000. It was stormed and taken by the Chilians in 1880. The treaty of 1883 provided that Arica and the department of Tacna were to be occupied by Chili for ten years.

Arichat, a seaport on the south side of Isle Madame, in the province of Nova Scotia, with a harbour for the largest vessels. It is the see of a Roman Catholic bishop. Pop. about 1000, largely engaged in fishing.

Ariège, a département in the south of France, lying along the northern slopes of the Pyrenees. It contains some of the highest mountain-summits in France, such as Montcahn, 10,513 feet, and Estats, 10,800 feet; but is comparatively level towards the north, where the climate is milder than amongst the hills. There are extensive forests; iron, coal, and other minerals are wrought, and there are cloth manufactures. Area, 1890 sq. m. Pop. (1886) 237,619.—The river Ariège rises in the Pyrenees, and after a course of 93 miles, falls into the Garonne near Toulouse.

Ariel, a man's name in the Old Testament, applied also to the city of Jerusalem by Isaiah. Gesenius, Ewald, and Fürst explain the word as 'lion of God,' but most of the ancient Jewish expositors as 'hearth of God.' In later demonology, it means a water-spirit. Thomas Heywood and Milton apply it to an angel. The literary currency of the name is due to Shakespeare's use of it in his *Tempest* as a name for a particular spirit of the air. At first in the service of the witch Sycorax, mother of Caliban, for his disobedience he is shut up by his mistress in the heart of a pine-tree. Prospero frees him after his imprisonment has lasted twelve years, uses his aid to raise storms, then lets him free into his native element.

Aries, the Ram, one of the signs of the zodiac, including the first 30 degrees of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place. The vernal equinox, or, as it is also called, the first point of Aries, is constantly changing its position among the fixed stars, in consequence of the Precession (q.v.) of the equinoxes. Hence the sign Aries no longer corresponds with the constellation Aries, which was the case about two thousand years ago. The present sign Aries is in the constellation Pisces, about 30° west of the original sign. See ZODIAC.

Ar'il (*arillus*), a peculiar covering of the seed in some plants, formed by an expansion of the *funiculus* (the cord which attaches the ovule to the *placenta*). This expansion takes place after fertilisation, and sometimes invests the seed entirely, sometimes only partially. The succulent red cup round the seed of the yew is a familiar example, and the white water-lily, the passion flower, and the willow also form characteristic arills. Another accessory covering, often called the arillode, is developed from the edges of the *micropyle* (the aperture by which the pollen tube enters the ovule). This in the nutmeg forms what is called *mace*. In the spindle-tree (*Euonymus europæus*), it forms the remarkable orange-coloured covering of the seed. See OUYE.

Arimaspi, a fabulous people, supposed by the ancient Greeks to inhabit the most northern region of the world, near the Rhipæi Montes, which Ptolemy places on the site of the modern Ural Mountains. They are described by Herodotus in the fourth book of his History, as one-eyed and fierce, engaged in perpetual conflict with the neighbouring griffins for the gold hoarded by them.

Ari'os, a river in the south-west of Brazil, which, after a north-west course of 700 miles, joins the Tapajós, itself an affluent of the Amazon.

Ari'on, a celebrated lute-player of Methymna in Lesbos, about 600 B.C. regarded by the ancients as the inventor of the dithyrambic metre. Having fallen among robbers in returning to Colonth from Tarentum, where he had won the prize in a poetical contest, he threw himself into the sea after playing on his lute. A dolphin, charmed by his music, carried him on his back safely to shore. The lute of a dolphin were placed among the constellations; and the story became a favourite theme with artists.

Ariosto, LUDOVICO, one of the greatest of Italian poets, was born at Reggio, September 8, 1474, being the eldest son of the military governor of that city. He was bred to the law, but abandoned it for poetry. However, at an early period of life, he was compelled to exert himself for the support of a large family, left as a burden on him at the death of his father. His imaginative powers were developed in early life. In 1503, after he had written two comedies, with several lyrical poems in Latin and Italian, he was introduced to the court of the Cardinal Ippolyto d'Este, who employed him in many negotiations, but was extremely niggardly in his rewards. Here, in Ferrara, in the space of about ten years, Ariosto produced his great poem, *Orlando Furioso*, which was published in that city in 1516, in forty cantos. After the death of the cardinal, the duke, his brother, invited the poet to his service, and acted to him with comparative kindness and liberality. In 1521 a second edition of his poems was published, the *Orlando Furioso* being still in forty cantos. Shortly after, he was commissioned by the duke to suppress an insurrection which had broken out in the wild mountain-district of Garfagnana; a task which seems more like a punishment than a mark of honour. Ariosto, however, succeeded in this arduous undertaking; and after remaining three years governor of the province, he returned to Ferrara, where he lived comfortably, nominally in the service of his patron, but in reality enjoying what he highly prized—an abundant leisure for prosecuting his studies. It was at this time that he composed his comedies, and gave the finishing touch to his *Orlando*. At length, in 1532, that poem made its appearance in a third edition, enlarged to its present dimensions of forty-six cantos. He now became seriously ill of a painful internal distemper, of which, after a few months of suffering, he died on 6th June 1533, in his 59th year. He was buried in the church of San Benedetto, at Ferrara, where a magnificent monument marks his resting-place. Ariosto is described in the Latin verses of his brother Gabrielle as a man of noble personal appearance and amiable character. His *Orlando Furioso* is a romantic, imaginative epic, marked by great vivacity, playfulness of fancy, and ingenuity in the linking together of the several episodes. It takes its name and its theme from a chivalrous romantic poem by Boiardo (q.v.), the *Orlando Innamorato*. That poem treats of the wars between Charlemagne and the Saracens, confounded as they were by tradition with those of Charles Martel, wherein Orlando, or Roland (q.v.), stood forward as the champion of Christendom. Orlando is the hero of Boiardo's piece, and falls in love with Angelica, a clever and beautiful oriental princess, sent by the Paynim to sow discord among the knights of the Christian armies. The story being left unfinished in the *Orlando Innamorato*, is taken up by Ariosto, who makes the lady fall in love with an obscure squire Medoro, on which Orlando gets frenzied, and long continues in a state of insanity. Besides his great work, Ariosto wrote comedies, satires, sonnets, and a number of Latin poems. Of these, the sonnets alone show signs of the genius of Ariosto. His Latin poems are mediocre indeed, and his comedies, besides lacking interest, are disfigured by repeated immoral and licentious passages. Only the elegance of the diction, in which Ariosto always excels, and the spirited dialogue, serve to stamp their origin. In 1845 there was discovered the mutilated manuscript of a second epic, *Rinaldo Ardito*, describing, like the *Orlando*, the battles of Charlemagne and his paladins. It was ascribed to Ariosto, but its genuineness is at least doubtful. Of the *Orlando* there are many English translations: by Harrington (1607 and 1634), Croker

(1755), Huggins (1757), Hoole (1783), and Stewart Rose (1823). In the last only is there to be found a fair representation of the feeling and spirit of the original. One of Ariosto's comedies had been rendered into English by Gaseigne as early as the year 1566. A list of the hundred and more editions of the *Orlando*, and of the various lives of its author, will be found in Ferrazzi's *Bibliografia Ariostesca* (Bassano, 1881).

Ariovist'us, a German chief who crossed the Rhine to help the Sequani in their struggle with the Ædui. Having gained a victory for the Sequani, he appropriated part of their territory, and soon swarms of Germans followed him into Gaul. The Sequani now joined the Ædui in imploring the help of Cæsar, who advanced to meet the Germans, and defeated them in a furious engagement, fought near Vesontium (? saunon), 58 B.C. Ariovistus, with only a few followers, escaped over the Rhine, and his subsequent history is unknown.

Aris'ta and Aris'tate. See Awn.

Aristæus, an ancient divinity whose worship in the earliest times was widely diffused throughout Greece, but whose myth is remarkably obscure. According to the common tradition, he was the son of Apollo and the nymph Cyrene, and was born near Cyrene, in Africa. Hermes placed the child under the protection of the Hore, or of Chiron the Centaur. After Aristæus left Libya, he went to Thebes, in Boeotia, where he was taught by the muses the arts of healing and prophecy, and where he married Autonoe, the daughter of Cadmus, by whom he had several children, including Actæon (q.v.). At Ceos, he liberated the inhabitants from the miseries of a destructive drought. He visited the islands of the Ægean Sea, Sicily, Sardinia, and Magna Græcia, leaving everywhere traces of his divine benignity. In Thrace, he was initiated in the mysteries of Dionysus; and he disappeared from the earth near Mount Hæmus. Aristæus, always a beneficent deity, was especially worshipped as the protector of vine and olive plantations, and of hunters and herdsmen. The great diversities in the legend were probably caused by the fusion into one of separate but similar local divinities.

Aristarchus (1) OF SAMOS, a celebrated ancient astronomer, of the Alexandrian school, who flourished 280-264 B.C. He seems certainly to have anticipated Copernicus, maintaining that the earth moves round the sun. For this we have the testimony of Archimedes: he was even accused of impiety on this account. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon (ed. by Wallis, Oxford, 1688). In this he shows the method of estimating the relative distances of the sun and the moon from the earth, by the angle formed by the two bodies at the observer's eye at that moment when the moon is exactly half-luminous. The principle was accurate in theory; but the angle to be measured was too small, and the available instruments too imperfect to give accurate results. (2) OF SAMOTHRAE, a very famous grammarian and critic, who flourished about 160 B.C. in Alexandria, where he educated the children of Ptolemy Philopator, and superintended the great library. His life was chiefly devoted to the elucidation and restoration of the text of the Greek poets—Pindar, the tragedians, and others, but especially Homer. The form in which we now have the Homeric poems preserved is in great measure owing to his judgment and industry. The strictness of his critical principles has made his name a proverbial expression for a severely just and judicious critic. He is said to have written 800 treatises, and founded a school of critics, some of whom have preserved fragments of

his works. To escape the tyranny of his old pupil, Ptolemy VII. Physkon, he fled to Cyprus, where he died at the age of 72, of voluntary starvation on account of an incurable dropsy. See Ludwich's *Aristarchus Homericus Textkritik* (Leip. 1884).

Aristides, surnamed 'THE JUST,' belonged to a good old Athenian family, and at the battle of Marathon (490 B.C.) was one of the ten leaders. Each of these was to hold the supreme command for one day; but Aristides, who saw the folly of the system, induced his companions to give up their claims, and make Miltiades commander-in-chief. Next year, Aristides was chief archon, and in this office, as in every other, secured the general respect of the citizens. About 483 the jealousy of his great rival Themistocles procured the banishment of Aristides. It is said that when an illiterate citizen, who did not know him personally, requested him to write his own name on the voting shell, he asked the man whether Aristides had injured him. 'No,' said the voter; 'but I am weary of hearing him always styled "the Just."'
Aristides submitted to the sentence with dignity, praying the gods, as he left the city, that the Athenians might not have cause to repent of their decision. Only three years later came Xerxes' overwhelming invasion. On the eve of the battle of Salamis, Aristides, hearing that the Greek fleet was hemmed in by that of the Persians, made his way from Ægina to offer his aid to Themistocles. He did good service in that great sea-fight; and, as Athenian general, he divided with Pausanias the glory of Plataea (479). In 477 B.C. he introduced a sweeping change into the constitution, by which all citizens, without distinction of rank, were admitted to the archonship. Through him, too, about the same time, Athens, not Sparta, became the ruling state of a maritime confederacy. He was an old man when he died (most likely in 468), and so poor, it is said, that he had to be buried at the public cost. He left a son and two daughters, for whom provision was made by the state. See Vom Berg, *Das Leben des Aristides* (Gött. 1871).

Aristippus, the founder of the Cyrenaic school of philosophy among the Greeks, was a native of Cyrene, in Africa. Having come into contact with Socrates on a visit to Athens, he became one of his pupils, and remained with the master almost up to his death, 399 B.C. He taught philosophy both at Athens and Ægina, and was the first of the pupils of Socrates to take money for his instruction. Aristippus passed a considerable part of his life in Syracuse, at the court of Dionysius, the tyrant, where he acquired the reputation of an elegant philosophic voluptuary. Plato says Aristippus was the only man he knew who could wear with equal grace both fine clothes and rags. Diogenes Laertius records a number of his sayings, which reveal a sharp, lively, and self-complacent nature. He lived some time at Corinth, in intimacy with the famous Lais, but towards the close of his life he is supposed to have retired to Cyrene. He taught his leading doctrines to his daughter Arete, by whom they were communicated to her son Aristippus the Younger. The latter is supposed first to have systematised them, as it is more than probable that Aristippus published nothing during his life. He prided himself more upon spending his days in what he conceived to be a philosophical manner, than in elaborating a philosophical system for the benefit of mankind.

The Cyrenaic school, who carried out the doctrines of Aristippus to their legitimate conclusions, professed a great contempt for speculative philosophy and for physical and mathematical knowledge. They confined their investigations to morals, and formed an ethical system completely in harmony

with the gay, self-possessed, worldly, and sceptical character of their master. Its chief points were: (1) that all human sensations are either pleasurable or painful, and that pleasure and pain are the only criterions of good and evil; (2) that pleasure consists in a gentle, and pain in a violent motion of the soul; (3) that happiness is simply the result of a continuous series of pleasurable sensations; (4) that actions are in themselves morally indifferent, and that men are concerned only with their results. The great philosophic sensualist stood out in strong relief against the gloom and austerity of Antisthenes and the Cynic school. The doctrine that makes pleasure the chief good is often called *Hedonism* (from Gr. *hedoné*, 'pleasure').

Aristobulus, an Alexandrian Jew and peripatetic philosopher, who lived about 170 B.C., was considered by the early fathers as the founder of the Jewish philosophy in Alexandria. He is said to have been the author of an allegorical commentary on the books of Moses, which showed that the oldest Greek writers borrowed from the Hebrew Scriptures; but it is now admitted that this work was written by a much later writer. For the Hasmonean or Maccabean princes of this name, in 106 B.C. and 64 B.C. respectively, see JEWS.

Aristocracy (Gr. *aristokratia*, from *aristos*, 'best,' and *kratos*, 'power') means etymologically the power or government of the best men. As used by Plato and Aristotle, it meant the government of a class, whose supremacy rested not on wealth alone, but on character and personal distinction. In point of fact, that class was a privileged one, consisting of the leading families, in which wealth and good-breeding were hereditary, and which long experience had trained to a habit of command. In an aristocracy, it was implied that the government of affairs should be for the public good, and not in a class interest. Oligarchy was a degenerate phase of aristocracy, in which the rule of the minority was founded on wealth, and conducted in its own narrow interests. Almost all countries have passed through a stage in which government has been in the hands of a privileged class, which may be called an aristocracy (when the class is markedly small in numbers, and narrow in spirit and policy, such rule is generally called an oligarchy). So it was in ancient Rome, and in the Italian states of the middle ages. In most of the European states, noble families have been powerful, at certain periods co-ordinate with the royal power, and even effacing it. The absolute states of modern times were based on the subordination of the noble families to the royal power. The king and aristocracy more recently combined to resist liberalism or constitutionalism. In modern English history, especially after the revolution of 1688, the government was really an aristocratic one for about a century and a half. That is to say, for that period the ruling power consisted of the noble families, only very partially controlled by the king, and only to a slight degree limited by the industrial class. The aristocratic element is still an influential one in the government of European countries. It is probably strongest in Prussia and weakest in France. See DEMOCRACY, GOVERNMENT.

Aristogelton. See HARMODIUS.

Aristolochia, a genus belonging to the dicotyledonous order Aristolochiaceae, which includes a large number of herbs and shrubs, frequently climbers, and which is specially abundant in tropical South America. Its affinities are obscure, owing to the peculiarly aberrant structure of its flowers: the tubular oblique perianth, dilated at its base, and the stamens adherent to the stigmas, are especially remarkable, and these characters are

associated with a no less peculiar mode of fertilisation. The fertilising insects (usually small flies) attracted by the expanded and coloured lip of the perianth, as well as by the frequently powerful and fetid odour, descend the narrowed perianth tube into the dilated base. Thence they are prevented from returning by the downward-directed hairs, with which the perianth tube is lined; these, however, wither when the stamens are fully matured, and the flies escape, dusted with pollen,



Aristolochia clematitis:
a, flower on larger scale; b, section of flower.

to enter another flower, and there become again imprisoned until after they have had abundant time to fertilise the stigmas, and acquire a new load of pollen in their efforts to escape. Several species of *Aristolochia* are found in the south of Europe: one only, the common Birthwort (*A. clematitis*), occurs upon the Continent as far north as about lat. 50°, and is a doubtful native of England. The order is, however, also represented in Britain by *Asarum europaeum*, or *Asarabacca* (q.v.). It has a long branching root, with an unpleasant taste and smell, which, with the roots of *A. longa* and *A. longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the name (Gr. *aristos*, 'best,' and *tocheia*, 'childbirth'). These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *A. indica* is used in the same way by the Hindus. *A. serpentaria*, Virginian Snakeroot, is a native of most parts of the United States, growing in woods. The root has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant and tonic properties. Its reputation as a cure for serpent-bites is shared by other species, particularly *A. anguicida* and *A. guaco* (the Guaco of Colombia), natives of the warmer parts of America; and it is said that a number of species are used by Egyptian jugglers, in order to their handling serpents with impunity. Several South American species seem also to possess medicinal properties analogous to those of the Virginian Snakeroot.—*A. Siphon*, a climbing shrub, of 15 to 20 feet in height, a native of the southern parts of the Alleghany Mountains, is frequently planted to form shady bowers, on account of its very large heart-shaped leaves (a foot in breadth), of a beautiful green. From the

owl-shaped base of its perianth, the plant has also received the name of Pipe-shrub, Pipe-vine, or Dutchman's Pipe.—Tropical species are distinguished for their beauty and the peculiar forms of their flowers, and are frequently cultivated in our hot-houses.

Aristophanes, the greatest of Attic, if not of all, comedians, was born about 448 B.C. His father held property in Ægina, which explains the poet's allusion (*Acharnians*) to the claim of that island by the Spartans, in order to secure him, and also his prosecution by Cleon on the charge of usurping civic rights. Of his personal history we have nothing recorded, except his deme and tribe, and that he had three sons—Philippos, Araros, and Nikostratos—all comic poets. The old comedy, of which Aristophanes is to us the representative, exercised an influence akin to that of the public press of our day in pamphlets and newspaper articles; it claimed to be guardian and censor of public morals, and the critic of current events. During the sixty years in which it flourished under the Athenian democracy, its distinctive feature was its plain-spoken and personal character. Full license for riotous fun and banter was given it by the season of its exhibition—viz. the Dionysiac festival. Its shafts were chiefly aimed at radical tendencies and novelties of any kind. Its plots were political burlesques; its famous *parabases* were addresses of the chorus to the audience, explaining its views on subjects of the moment—somewhat like the topical song in our pantomimes. Aristophanes is said to have written fifty-four plays, but eleven only are extant, which may be ranged under the categories of political, philosophical, social, and literary; and again under three periods, ending respectively 425, 406, and 388 B.C., about which last date he died. To the first period belong (1) the *Acharnians*, (2) the *Knights*, (3) the *Clouds*, (4) the *Wasps*, the poet's four masterpieces, named from their respective choruses, and (5) the *Peace*, in all of which full rein is given to political satire. To the second, (6) the *Birds*, (7) the *Lysistrata*, (8) the *Thesmophoriazuse*, (9) the *Frogs*, in which we find less political raucous, and more reticence and caution. To the third, the *Ecclesiazuse* and *Plutus*, comedies of a tamer type, known as that of the middle comedy, in which political allusions and the distinctive characteristic of the old comedy, the *parabasis*, disappear.

Aristophanes made his debut with the *Reckless* (c. 427 B.C.), in which the teaching of the Sophists, then becoming fashionable, is contrasted with the simplicity of the old education. It was followed by the *Babylonians*, a satire on the various magistracies in Athens, which contained incidentally a preliminary attack on Cleon, one of his *bêtes noires*, to which the poet alludes in his next year's play, the *Acharnians* (425 B.C., the seventh year of the Peloponnesian war). This was brought out, as were also the other two, in the name of Kallistratos. In this, the first of his eleven extant plays, Aristophanes pleads the cause of the aristocratic peace-party against the democratic war-party, whose selfish aims and place-hunting, disguised under the cloak of patriotism he exposes with unsparing ridicule. Dikaiopolis, an honest farmer, concludes a peace for thirty years between himself and family on the one side, and the Spartans and their allies on the other, and keeps the rural Dionysia after six years' interval. The old charcoal-burners of Acharnai, who will not hear of peace, because their lands have been ruined by the Spartan invasion, attack him; but he pleads the enemy's cause, and converts half the chorus to his view, while the discontented half fetch the swash-buckler general Lamachos to overawe the traitor. Dikaiopolis holds open market with the sworn enemies of

Athens, and enjoys himself in the midst of his good cheer, while Lamachos is depicted in piteous flight and mortal pain, after the hardships of campaigning.

The *Knights* (424 B.C.) was the first play produced in the poet's own name. It is aimed entirely at Cleon the tamer, the most prominent demagogue of the day, whose success at Pylos was a bitter disappointment to his opponents. Demos, the Athenian John Bull, is a cross, dull-witted, and superstitious old man, who has intrusted the management of his household to a bullying Paphlagonian slave (Cleon). Two of his fellow-slaves (Demosthenes and Nicias) conspire against his tyranny, with the Knights, who represent the richer classes of Athens, and contrive that he shall be supplanted by a sausage-seller. Demos is then renovated by being boiled, and becomes youthful and sensible once more.

The *Clouds* (423 B.C.) is a protest against the growing spirit of scepticism at Athens, where it was becoming the fashion for youths to frequent the new schools of the Sophists. To the conservative instincts of Aristophanes this was bitter gall, and he ridiculed the whole profession with Socrates at their head. The latter, by his ungainly personality and eccentric habits, was a good subject for caricature; but Aristophanes' picture is no truthful portrait of the great philosopher, one of whose chief aims and merits was to expose shams.

Strepsiades is being ruined by his spendthrift son Pheidippides (Alcibiades). His only chance of safety is to send his son to the 'Phrontistery' or *Pensoir* of Socrates, where he will learn to make the worse appear the better reason, which his creditors unfortunately hold. The son bluntly refusing, the father goes himself, but proves too stupid and forgetful to learn; so the son reluctantly enters the school, and learns the worse reason with a vengeance. In the famous dialogue between the Just and the Unjust Argument, the latter wins the day, and so obtains the control of the pupil, who is imbued with the new ideas so thoroughly, that, at a feast given him by his father on his return home, he sings an immoral speech from Euripides, beats his father, and justifies the act by his newly learned sophistry. The eyes of the old man are opened, and he wreaks his vengeance on Socrates by setting the *Phronsi* and its inmates on fire.

The *Clouds* is unequalled in ancient comedy for simplicity and perfection of plot, and morality of tone. It is the nearest approach to a modern French play; it exhibits the development of a possible action and real characters, and not merely a string of comic situations. In repartee it is not excelled by any play of Molière, and Shakespeare at his best shows no richer humour.

The *Wasps* (422 B.C.), of which Racine's one comedy *Les Plaideurs* is an imitation, is a counterpart of the *Clouds*, in which a father converts his son, while in the *Wasps* a son reforms his father. The two principal characters are Philocleon, an old dikast, and his son Bdelycleon, who tries to cure his father of his mania for sitting in the court, and gets up for him a mock trial of a dog at home. In the latter half of the play, the vulgar element predominates; it represents Philocleon's conversion to the ways of society, but he behaves unexpectedly with more than the license of youth.

The *Peace* (421 B.C.) may be called a leading article in favour of the Peace of Nicias, when both Cleon and Brasidas were dead. The first half of the play represents the recovery of Peace from heaven, whither Trygaeos had gone on a beetle's back to fetch her; the second, the social enjoyments which welcome her restoration to the earth. Its hearty humour, its beautiful descriptions of rural life and its pleasures, are inimitable.

The *Birds* (414 B.C.) is a brilliant pantomime. Its aim is vague if looked on as a satire. It was composed at a period of great excitement, when Athens was in the fever-heat of preparation for the Sicilian expedition, and Alcibiades was in every mouth, but it was not produced until eight months afterwards. Peithetairos (Alcibiades) and his friend Enelpides start a scheme for making the birds build a city (Cloud-cuckoo-town) in mid-air, and establish their sovereignty, so as to shut off the gods, and intercept men's offerings to them. The gods submit and allow Basileia, daughter of Zeus, to be married to Peithetairos.

The *Lysistrata*, or 'Strike of the Wives' (411 B.C.), exhibits the women of all Greece taking the question of war into their own hands, and refusing their lords their rights until they consent to make peace.

The *Thesmophoriazusa*, the most diverting of all Aristophanes' plays, was brought out three months later. It contains an attack on the morality of Athenian women and on Enripides; it does not interfere in politics.

The *Frogs* (405 B.C.) is a literary criticism. The first part contains the adventures of Dionysos on his journey to Hades in search of a good poet, Sophocles and Euripides being just dead; the second, the poetical contest between Eschylus and Euripides, and the victory of the former.

In the *Ecclesiazusa* (393 B.C.), or 'Ladies in Parliament,' Aristophanes satirises the communistic theories which were afloat, by making the women occupy the Phyx, disguised as men, and decree a new constitution with full community of property and wives. The play is remarkable for its witty repartee.

The *Plutus* (388 B.C.) is unique among Aristophanes' plays. It is a satire on humanity; its subject, the unjust distribution of wealth, the cause of which is the blindness of Plutus. His sight is restored to him by Asklepios, and then matters are righted; the god bestows his favours only on the deserving, to the ruin of many evil trades.

The choruses are the part of his work on which Aristophanes lavished the greatest wealth of his exuberant fancy. A study of these will give an idea of the varied resources of his genius, passing with prodigious fullness of the most comical fancies to the most charming descriptions, such as recall the idyllic grace of Theocritus, and to the most sublime conceptions.

The first printed edition of Aristophanes was the Aldine (Venice, 1498); it contains nine plays. Junta (1515) added two. Other editions are those of Bergler (1760), Brunck (1783), Invernizzi-Reck (1794), containing a collation of the Ravenna or oldest MS., Bekker (1829), Dindorf (*Poetae Seculi*, 5th ed. 1863), Bergk (1857), Meineke (1860), Blaydes (1886), Holden (5th ed. 1887). There are translations of single plays by Mitchell (1822), J. H. Frere, Walsh (1837), B. B. Rogers, B. H. Kennedy, R. Y. Tyrrell (1883).

Aristotelia. See MAQUET.

Aristotle was born at Stagira (Stageira), a Greek colony on the Macedonian peninsula Chalcidice, in the year 384 B.C. He belonged to a family in which the practice of physic was hereditary. His father, Nicomachus, was the friend and physician of Amyntas II., king of Macedonia, father of Philip, and grandfather of Alexander the Great. Aristotle lost both parents while he was quite young, and was brought up under the care of Proxenus, a citizen of Atarneus, in Asia Minor, who was then settled at Stagira. It is to be conjectured that his education would take the direction of preparing him for the family profession. In after-life, he occupied himself largely in the dissecting of animals, and was acquainted with all

the facts that had been derived from this source by others before him. It seems probable, however, that he early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake, in which he attained a distinction without parallel in the history of the human race.

In his 18th year (367 B.C.) he left Stagira for Athens, then the intellectual centre of Greece and of the civilised world. Plato, on whom he doubtless had his eye as his chief instructor, was then absent at Syracuse in that extraordinary episode of his life, connecting him as political adviser with the two successive Syracusan despots—Dionysius the Elder, and Dionysius the Younger—and with Dion. Aristotle, therefore, pursued his studies by books, and by the help of any other masters he could find, during the first three years of his stay. On the return of Plato, he became his pupil, and soon made his master aware of the remarkable penetration and reach of his intellect. We are told that Plato spoke of Aristotle as the 'intellect of the school.' Unfortunately, there is a total absence of precise information as to the early studies of the rising philosopher. He remained at Athens twenty years, during which the only facts recorded, in addition to his studying with Plato, are, that he set up a class of rhetoric, and that in so doing, he became the rival of the celebrated orator and rhetorical teacher, Isocrates, whom he appears to have attacked with great severity. It was in the schools of rhetoric that the young men of Athens got the principal part of their education for public life. They learned the art of speaking before the *Dikasteries*, or courts of law, and the public assembly, with efficiency and elegance; and incidentally acquired the notions of law and public policy that regulated the management of affairs at the time. We can easily suppose that Aristotle would look with contempt upon the shallowness—in all that regarded thought or subject-matter—of the common rhetorical teaching, of which, doubtless, the prevailing excellence would lie in the form of the address, being artistic rather than profound or erudite. One of the disciples of Isocrates, defending his master against Aristotle, wrote a treatise wherein allusion is made to a work (now lost) on proverbs, the first recorded publication of the philosopher.

The death of Plato (347 B.C.) was the occasion of Aristotle's departure from Athens. It was not extraordinary or unreasonable that Aristotle should, hope to succeed his master as the chief of his school, named the Academy. We now know that no other man then existing had an equal title to that pre-eminence. Plato, however, left his nephew Speusippus as his successor. We may suppose the disappointment thus arising to have been the principal circumstance that determined Aristotle to stay no longer in Athens; but there are also other reasons that may be assigned, arising out of his relations with the Macedonian royal family at a time when the Athenians and Philip had come into open enmity.

Whatever may be the explanation, he went in his thirty-seventh year, after a stay of nearly twenty years in Athens, to the Mysian town of Atarneus, opposite to the island of Lesbos. Here he lived with Hermias, the despot of the town, a man of singular energy and ability, who had conquered his dominion for himself from the Persians, at that time masters of nearly all Asia Minor. Aristotle had taught him rhetoric at Athens, and he became in return the attached friend and admirer of his teacher. For three years the two lived together in the stronghold of Atarneus until the death of Hermias at the hands of a treacherous enemy. Aristotle took refuge in

Mitylene, the chief city of Lesbos, taking with him Pythias, the sister or niece of Hermeias, whom he made his wife. In a noble ode he has commemorated the merits of his lost friend. His wife, Pythias, died a few years afterwards in Macedonia, leaving him a daughter of the same name. His son, Nicomachus—whose name, for whatever reason, has been given to the chief of the ethical writings that have come down to us among the works of Aristotle, the *Nicomachean Ethics*—was born to him at a later period of his life by a concubine.

After two years' stay at Mitylene, he was invited (in the year 342 B.C., age 42) by Philip to Macedonia, to educate his son Alexander, a boy of thirteen, who for at least three years was the pupil of Aristotle. The two parted finally when Alexander set forth on his expedition into Asia (334 B.C.), and Aristotle came from Macedonia to Athens, having recommended to the future conqueror, as a companion in his campaigns, the philosopher Callisthenes, whom he had educated along with Alexander. Now at the age of 50, he entered on the final epoch of his life; he opened a school called the 'Lyceum,' from its proximity to the temple of Apollo Lyceus. His followers came to be called the *Peripatetics*, either from his practice of walking up and down in the garden during his lectures, or because the place was known as 'The Walk' (*Peripatos*). The tradition that it was his habit to give a morning lecture to select pupils on the more abstruse subjects, and one in the evening of a more popular kind to a general audience, is based upon a mistake. This crowning period of his life lasted twelve years. After the death of Alexander, the anti-Macedonian party at Athens obtained the ascendancy, and among other consequences, an accusation was prepared against Aristotle, the pretext being impiety. With the fate of Socrates before his eyes, he chose a timely escape, and in the beginning of 322 B.C., took refuge at Chalcis in Euboea, where, in the autumn of the same year, he died, aged 62. He had long been afflicted with indigestion, and ultimately sank under this malady.

Many of the details recorded of Aristotle's life, coming as they do from late and very uncritical authorities, must be considered uncertain; but the foregoing account may be accepted as in the main correct.

Of the numerous writings which have come down to us under the name of Aristotle, some are undoubtedly not his; some may be the products of his school, though not the direct work of the master himself. Even of his most famous and undisputed works, the structure is so irregular, and the style so unequal, that it has been with great probability supposed that they are to a large extent not finished writings, but notes and rough jottings edited by disciples, sometimes perhaps more reverent than judicious. There is indeed a story told by Strabo the geographer, who lived in the time of Augustus, that the works of Aristotle were first collected and edited by Andronicus of Rhodes (70 B.C.). How far this may account for the condition of 'our Aristotle' is a matter of dispute among scholars. We hear (e.g. from Cicero) of Dialogues written by Aristotle. Of these only a few unimportant fragments remain. They were probably written whilst he was still Plato's pupil. Those works which we possess all belong, apparently, to the last twelve years of his life (though the materials for them may have been collected previously), and it is therefore likely enough that many of them were left unfinished at his death. The commentaries written on some of these works by ancient scholars (e.g. Alexander of Aphrodisias, Themistius, Philoponus, Simplicius) during the early centuries of

the Christian era, form of themselves a great mass of literature.

In the middle ages, Aristotle's philosophy became known to the learned in the Western Church, at first mainly through Arabian translations, which in their turn were translated into Latin. The Arabian philosophy (of Avicenna, 1000 A.D., and Averroës, 1150 A.D.) was based upon Aristotle, with the addition of Neoplatonic elements. At the time when what was supposed to be the Aristotelian system was (especially through the influence of Thomas Aquinas, died 1274 A.D.) dominant in Western Europe, Aristotle's works were hardly known to any one in the original; nor could they have been appreciated in an unscientific age. The Aristotelianism which the medieval schoolmen admiringly followed, and which, at a later time, Bacon and others as blindly attacked, was very different in spirit from the real philosophy of Aristotle. For the history of Aristotelianism in the middle ages, see SCHOLASTICISM.

The method and system of Aristotle are frequently supposed to be in complete contrast to those of his master Plato. It is said 'Plato was an idealist, Aristotle an empiricist,' &c. This is misleading: the difference is great in appearance mainly; and this appearance is partly due to Aristotle's habit of criticising Plato very severely, though, on the whole, the relation between the two philosophers has been well expressed by Sir Alexander Grant's phrase that 'Aristotle codified Plato.' There is certainly a great difference in temperament between them, and a very great difference in literary manner. Plato was a poet, and is always an artist, as well as a thinker, in his Dialogues. Aristotle, with the education of a physician, has the mental habits and tendencies of the man of science predominant; and while lacking Plato's inspiration and enthusiasm, has a wider, in fact, an all-embracing range of interests, and cares more for actual facts for their own sake. He appears to have projected what may be called an Encyclopedia of Philosophy, though the scheme is only imperfectly carried out in his works.

Aristotle distinguishes three kinds of thinking: (1) Theoretic; (2) Practical; (3) Productive. Corresponding to these we have three divisions of Philosophy: (1) Theoretic Philosophy is subdivided into (a) First Philosophy or Theology; (b) Mathematics; (c) Physics, i.e. the Philosophy of Nature. (2) Practical Philosophy is subdivided into (a) Ethics; (b) Economics (i.e. the practical science of household management, to which *Chrematistic*, the science of wealth, is only a subordinate science); (c) Politics. (3) *Public* (Productive) Philosophy, corresponding to what we should call the Philosophy of Art, would apparently be subdivided according to the different arts (painting, sculpture, poetry), but Aristotle has not specially treated of any branch except poetry.

Logic, which Aristotle himself calls 'analytic,' does not form a division of philosophy, but is rather a study of the *method* of scientific proof (which aims at truth). The term 'logical' Aristotle applies specially to dialectical argument (which aims at refutation of opponents). Aristotle's followers held (in opposition to the Stoics, who divided all philosophy into logic, physics, ethics) that logic was not a part of philosophy, but its 'instrument' (*Organon*). Hence this name was given to the Aristotelian treatises on the subject. In the subsequent history of the science, the most influential of these treatises have been the *Categories* (containing the famous list of ten classes of predicates, substance, quality, quantity, &c.) and the *Prior Analytics* (containing the doctrine of syllogistic moods and figures); but for

the student of Aristotelian philosophy the most important is the *Posterior Analytics*, which contains his theory of knowledge and of scientific method. The defects which modern logicians have found in the Aristotelian logic are due mainly to the fact that the only science which in his day had reached a sufficiently advanced stage to have its method fairly analysed was the science of geometry. The analysis of its methods could hardly furnish an adequate account of the processes of reasoning in the less abstract sciences of nature. Formal deductive logic has hardly undergone any important modifications since Aristotle's time; but the so-called Aristotelian logicians have often had little enough of Aristotle's scientific spirit. Aristotle himself boasts with truth that in working out the theory of reasoning (*syllogism* is only the Greek term for 'reasoning' or 'inference') he had no predecessors.

In the *Rhetoric*, Aristotle deals with the art of persuasion. In this subject he had predecessors; but most subsequent treatises have added little to what he has said. This work, though usually classed along with the *Poetics*, since both deal with literature, may also be properly connected with the logical writings, the longest of which, the *Topics*, deals with dialectical argument and reasoning from probabilities.

The name *Metaphysics* (i.e. 'after the Physics') was given to Aristotle's discussions on 'first philosophy,' because they were placed by his editors *after* his books about nature. The work is in a very confused condition, and is in consequence extremely difficult. It begins with a sketch of preceding Greek philosophy, leading up to a criticism of Plato's doctrine of 'ideas' or universals. In opposition to Plato, Aristotle insists that reality is to be found only in individual things, each of which is a combination of *Form* (the universal element) and *Matter*; but his own doctrine, that knowledge can only be of universals, is the same as Plato's, though stripped of Plato's paradoxical modes of expression. His most important advance beyond Plato consists in his thoroughgoing application of the distinction of the *potential* and the *actual*. Actuality (realisation) and potentiality correspond to form and matter respectively, but the former terms are dynamical, the latter statical. All being he regards as a continuous ascending scale from mere matter (about which, because it is quite destitute of form, we can say nothing) up to the pure actuality, or 'thought thinking itself,' which he calls God. (Hence the name 'Theology' also given to the 'first philosophy'—'first,' because it deals with the highest and ultimate problems of being.) Any individual object is intermediate between these two extremes, though at different stages—e.g. a block of marble is less formed, less actualised, than the statue made of it. In trying to understand or explain any individual object, we must consider it in four ways: (1) What are the material conditions of its existence? (2) What is its form or essential character as formed or realised? (3) Through what agency does it come into being? (4) What is the end or result attained by it? This is the famous doctrine of the 'Four Causes,' called respectively material, formal, efficient, final.

The books called the *Physics* deal mainly with what we should call the metaphysical aspects of movement (under which conception Aristotle includes growth and qualitative change), time, place, &c. Aristotle's application of his speculations about motion to a theory of the physical universe, exercised a bad influence (especially in the case of astronomy) on those whose admiration led them to accept his opinions as unquestionable dogmas.

The subject of mathematics he does not expressly treat himself, that science having already become sufficiently specialised and separated from the other departments of human thought. His works on Animals, though now possessing only an antiquarian interest, prove him to have been a close and acute observer of nature so far as, in the absence of all scientific aids to observation, his limited opportunities went; nor did he, as often alleged, neglect experiment, though doubtless not fully aware of its importance. Many modern biologists have been ready to bear testimony to the genuinely scientific character of his observations; and, indeed, his metaphysical theory provided him with an evolutionary conception of nature such as has only been recovered in recent times. His book *On the Soul* is as much a biological as a psychological treatise (for 'soul' means for him the vital principle in plants and animals, of which the thinking human soul is only the highest stage); yet in this treatise he may be regarded as the founder of psychology as a distinct science. In one of his shorter treatises, which deals with memory, he gave a first statement of the law of association of ideas.

His *Ethics* and *Politics*, though apparently less studied, at least less commented on, in antiquity than his other works, have in medieval and modern times exercised an enormous influence. Thus his conceptions of the various virtues and vices have, because of their adoption by St Thomas Aquinas and other medieval doctors, passed into European literature—e.g. in Dante, Spenser, &c. At the revival of letters, and at the Reformation, when antipathy to medieval theology caused a general disparagement of Aristotle's philosophy, Aristotle's *Politics* exercised a direct influence on the rise of modern political philosophy: it even helped to keep alive ideals of political liberty in an age when rulers were becoming more absolute and despotic. Aristotle is said to have made a collection of 158 'Constitutions,' as a preparation for writing his *Politics*. Only a few slight fragments of this collection are preserved. The *Economics* are not considered to be a work of Aristotle's own. His observations on the subject are to be found in Book I. of the *Politics*. In his remarks on *Chrematistic* (*Pol.* i. 8 11) are to be found the first germs of the science now called 'Political Economy.'

The *Poetics* is an incomplete work, and contains little more than a discussion of tragedy; but even so, few, if any, books on literary criticism have had more influence—and here, as elsewhere in the case of Aristotle, partly through misunderstandings. The famous doctrine of 'the three dramatic unities' is not in the *Poetics*. Only the unity of plot is insisted on by him.

The great edition of Aristotle is still that of Bekker, published by the Prussian Royal Academy (Berlin, 1831–40). Aristotle is now generally quoted by scholars according to the pages, columns, and lines of this edition. Bekker's text has been reprinted at Oxford (1837; 11 vols. 8vo). The Berlin edition also includes Latin translations, *Scholæ* edited by Brandis, and a complete *Index* by Bonitz. The best edition of the ancient commentaries is that published at Berlin in 25 vols. There are excellent critical texts of some parts of Aristotle (*Eth.*, *Pol.*, *De An.*) published by Teubner, Leipzig. In Germany there has been a great succession of Aristotelian scholars, who have edited, translated, and expounded portions of his writings—e.g. Bonitz (ed. *Metaph.*), Schwegler (ed. and trans. *Metaph.*), Trendelenburg (ed. *De An.*), Torstrik (ed. *De An.*), Waitz (ed. *Organon*), Susenhihl (ed. and trans. *Politics*), &c. The French version of St Hilaire is readable, but untrustworthy. In English there is no good or even tolerable translation of all Aristotle. The *Nicomachean Ethics* has been edited with essays and commentary by Sir A. Grant, who also wrote the article 'Aristotle' in *Ency. Brit.*, 9th ed., and *Aristotle* in Black-

wood's series of *Ancient Classics for English Readers*: the best translation is by Peters. The *Politics* has been translated by Jowett (with introduction and notes) and by Weldon. The *Rhetoric* has been edited by Cope and translated by Weldon. The *Poetics* has been translated by Twining (printed in Donaldson's *Greek Theatre*) and by Wharton (Oxford 1883), edited with notes by Moore (Oxford, 1875). The *De Anima* has been translated and expounded by E. Wallace, who also wrote *Outlines of the Philosophy of Aristotle*. Poste's translation of *Post. Anal.* and edition of *Soph. Eleuch.*, and Dr Ogle's translation of *The Parts of Animals*, may also be named among the few good English works on Aristotle. For general accounts of Aristotle's philosophy, besides the writings of Grant and Wallace already mentioned, there are Grote's *Aristotle* (though only the *Organon* is treated in any detail), and Zeller's *Aristotle* (Eng. trans. 1888) — the latter indispensable to the student.

Aristotle's Lantern, the five-toothed masticating apparatus found round the beginning of the alimentary canal of some sea-urchins. The structure owes its name to its discoverer and its general shape. See SEA-URCHIN.

Aristoxenus OF TARENTUM, a pupil of Aristotle, and one of the oldest writers upon music, flourished about 350 B.C. He was extraordinarily active and versatile in his literary studies, and is said to have composed 453 treatises on music, history, and philosophy. He founded a school of musicians, who judged of the notes in the diatonic scale by the ear, while the Pythagoreans determined them by certain numerical ratios. Except some fragments, we only possess his *Elements of Harmony* (ed. by Marquard, Berlin, 1869).

Arithmetic is the science that treats of numbers (Gr. *arithmos*). It is sometimes divided into theoretical and practical; the former investigating the properties of numbers and their combinations, the latter applying the principles so established, in the form of rules, to actual calculations. Some restrict the term arithmetic to this art of reckoning, assigning the investigation of the principles to analysis. Anciently the science of reckoning was usually called *logistic*; while arithmetic dealt with forms of numbers, primary numbers, &c.

Arithmetic is said to have been first developed into a science in India; the Egyptians reckoned the god Thoth the first teacher of numeration. Among the ancient Greeks and Romans, arithmetic made little progress, owing to their clumsy modes of notation. Few of their writings on the subject have come down to us; the most important are those of Euclid, Archimedes, Diophantus, and Nicomachus. After the introduction of the decimal system and the Arabic or Hindu numerals (see NUMERALS), about the 11th century, arithmetic began to assume a new form. Early in the 13th century, Sacro Bosco wrote his *Algorithmus seu Arithmetice Introductio*; Pacioli wrote in the 15th century; and in the 16th, Adam Riese and Apianus. It was not till the 16th century that the Double Rule of Three, or Compound Proportion, was discovered, and decimal fractions were introduced. The invention of Logarithms in the 17th century is the last great step in advance that the art has made. The elementary operations in Arithmetic are Addition, Subtraction, Multiplication, and Division. The subjects of Fractions, Decimals, Practice, Proportion, Logarithms, Interest, Discount, Square and Cube Root, will be noticed in their proper places. Annuities, Averages, Insurance, Mensuration, and Partnership give rise to branches or special applications of arithmetic. The various methods of Notation and the forms of the numerals employed by the Greeks, Romans, Chinese, and other nations, are separately treated at Notation and Numerals. The theory of Num-

bers (q.v.) is a subject cognate to arithmetic. See also ALGEBRA and ANALYSIS. Contrivances such as the Abacus, the Calculating Machine, and Napier's Bones, are treated under their own heads.

Arithmetical Mean is that number that lies equally distant between two others: thus, the arithmetical mean between 11 and 17 is 14, which is found by taking half their sum.

Arithmetical Progression is a series of numbers that increase or diminish by a common difference, as 7, 10, 13, 16, 19, 22; or, 12, 10½, 9, 7½, 6. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms. The series of natural numbers, 1, 2, 3, 4, &c. form an arithmetical progression, of which the difference is 1.

Arithmetical Signs are arbitrary marks or symbols used to denote the operations to be performed on numbers, or the relations existing between them. The sign of Addition is +; of Subtraction, -; of Multiplication, ×; of Division, ÷; of Equality, =. De Morgan, followed by Stokes and others, introduced for division the convenient symbol /; thus, 18/3 has the same meaning as 18 ÷ 3 or 18/3. The same signs as in Arithmetic are also used in Algebra; and an enumeration and explanation of them may be found in almost any treatise on either subject.

Arius (Gr. *Ἀρειος*), the celebrated founder of Arianism, was a native of Libya, and is generally supposed to have been born shortly after the middle of the 3d century. About the year 306 A.D., Alexandria was thrown into confusion by the violence of its religious disputes, and in these Arius was largely concerned. At first, he took part with Meletius, Bishop of Lycopolis, in Upper Egypt, a man who was strenuously opposed to certain notions of discipline entertained by Peter, Bishop of Alexandria. He was excommunicated by Peter in consequence; but the latter dying soon after, Achillas, his successor, restored him to his office, and even advanced him to the dignity of a presbyter, 313. Arius was first brought into collision on a point of doctrine with his ecclesiastical superiors in 318. Alexander, the successor of Achillas, having in a public assembly of clergy, while speaking of the Trinity, said that it contained one single essence, or indivisible unity of substance, Arius alleged that such a conception was impossible to the human mind, and accused Alexander of Sabellianism — i.e. of destroying the distinction of persons. In maintaining his ground, Arius went beyond his first statement of the absolute distinctness of person between the Father and the Son; he maintained that the Son was not co-equal or co-eternal with the Father, but only the first and highest of all finite beings, created out of nothing by an act of God's free-will, and that he ought not to be ranked equal with the Father.

Arius was successful in securing the adherence of large numbers both of the clergy and laity in Egypt, Syria, and Asia Minor. In 321 a synod of bishops at Alexandria deposed and excommunicated him. To escape persecution, he retired to Palestine, whence he wrote a letter to his friend Eusebius, Bishop of Nicomedia. Eusebius warmly sympathised with him; wrote in his behalf to Paulinus, Bishop of Tyre, and others; absolved him from the Alexandrian synod's excommunication; and in 323 convened another synod in Bithynia, which pronounced favourably on Arius. While Arius was residing at Nicomedia, he wrote a theological work in verse and prose, called *Thaleia*, some fragments of which remain. The *Thaleia* is said to have been sung by the Arian neophytes, who thus kindled the passions of their adversaries, and increased the virulence of the contest. The

comedians, who were pagans, took advantage of the occasion to ridicule the Christian religion in the theatres.

It now became impossible for the Emperor Constantine to remain neutral or indifferent, and in order, as he thought, to effect a final settlement of the question, he convoked the memorable Council of Nicea, or Nice (q.v.), in Bithynia, 325. Three hundred and eighteen bishops from almost all parts of the Christian world, but especially from the East, were present, besides numbers of priests, deacons, and acolytes. Arius boldly expounded and defended his opinions. He declared in the most unambiguous manner that the Son of God was created out of nothing; that he had not always existed; that he was not immutable or impeccable; that it was through his free-will he remained good and holy; that if he had chosen, he could as easily have sinned as not; in a word, that he was a mere creature and work of the Deity. He further affirmed that the Son of God was not of the same substance with the Father; that he was not the 'Word' or 'Wisdom,' properly speaking; and that the Scriptures only attribute these names to him as they do to other created intelligences. These propositions were listened to with great calmness by the bishops, but the inferior clergy, or at least a majority of them, manifested the most violent opposition. Alexander, Bishop of Constantinople, was ably seconded by the young deacon, Athanasius (q.v.), the equal of Arius in eloquence, and in the power of his logic. It was principally by the reasonings of Athanasius that the Council was persuaded to define, in the most precise manner, the doctrine of the Godhead viz. the absolute unity of the divine essence, and the absolute equality of the three persons. All the bishops subscribed it except two, who were banished, along with Arius, to Illyrium.

An imperial edict was now issued commanding the writings of the heresiarch to be burned, and threatening with capital punishment all who should be convicted of concealing them. But at Alexandria, the Arians continued in a state of open insurrection, and began to league themselves with other condemned sects. The great influence of Eusebius was also exerted on behalf of the exiled heretic, as well as that of Constantia, the sister of the emperor, who had herself embraced Arian tenets, and in 328 permission was granted to Arius to return from Illyrium. In 330 he had an interview with the emperor; and, in the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that, as the 'Word,' he had made all things both in heaven and earth. The emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive Arius into the communion of the church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius was greatly irritated. He called a synod of bishops at Tyre, in 335, which proceeded to depose Athanasius. The emperor was even prevailed on to remove him to Gaul. In the same year, another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still the majority of the Christians of Alexandria clung to the doctrines of Athanasius. Disappointed in his expectations, Arius, in 336, proceeded to Constantinople, where he presented the emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to him the holy communion on the Sunday following. Before the ceremony, however, he died so suddenly that his disciples declared that he had been poisoned, while the orthodox devoutly affirmed that God had answered the prayers of Alexander.

The manners of Arius were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged by a single enemy. He is said to have composed songs for sailors, millers, and travellers, in popular measures, for the purpose of spreading his peculiar tenets; but no traces of these survive.

After his death, his followers rallied round Eusebius, now Bishop of Constantinople (338), from whom they were styled Eusebians. Constantine, who ruled the West after the death of Constantine (337), and Constantius in the East, made an essay towards reconciliation; but it failed at the synod of Sardis (347), where the occidental bishops gathered themselves round Athanasius in support of the *Homoousian* doctrine (identity or *sameness of substance*), while in a separate council at Philippopolis, the oriental bishops asserted the *Homoiousian* doctrine (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense, and pervaded almost all departments of public and private life. Constantius having gained dominion over the West, the Arian cause, which he favoured, triumphed at the synod of Arles (353) and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side, and was strictly maintained by the banished Athanasius and his friends, while the Antineicenes, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomoeans, or Heterousians, asserted, in the boldest style, their doctrine of 'distinct substances.' The semi-Arians (a large majority in the Eastern Church) maintained the Homoiousian doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Niceneans. Julian the Apostate (361-3), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, so that they did not interfere with his plans. Jovianus and his followers in the West, Valentinianus I., Gratianus, and Valentinianus II., extended full toleration to both parties. Arianism at last was virtually suppressed in the Roman empire, under Theodosius in the East (379-95), and Valentinianus II. in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Moso Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348; and they adhered to it until the synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Lombards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Lombards, who retained the Arian creed until 662. The Arian controversy was revived in England for a time by the writings of the learned Dr Samuel Clarke (1675-1729), and also by Whiston (1667-1752). The denial of 'the eternal sonship' was broached in the Wesleyan Methodist Society by Dr Adam Clarke (1762-1832) and a few followers; but it was soon suppressed by the Conference. The greatest English writer who held distinctly Arian or semi-Arian views was Milton. Arianism has been superseded by Unitarianism. See Kölling's *Geschichte der Arianischen Häresie* (2 vols. Gütersl. 1875-83).

Arizona, a territory of the United States of America in 30° 20'—37° N. lat., 109°—114° 45' W. long. It is bounded N. by Copyright 1888 in U.S. Utah, E. by New Mexico, S. by the republic of Mexico (Sonora), and W. by California and Nevada. Its western

boundary is mostly formed by the Colorado of the West, a large river remarkable for its great cañons. This river traverses the NW. part of Arizona in a deep and narrow water-worn channel (the Grand Cañon), more than 300 miles long, and nowhere less than a mile below the surface of the surrounding country. Arizona has an area of 112,920 sq. m.; it is thus nearly as large as Italy. It is in general a region of high plateaus, traversed by various mountain-ranges, presenting abundant evidence of not remote volcanic action. In the SW. the country has a desert character, and in all parts the rainfall is decidedly limited in amount. In various parts there are extensive lava-beds. The whole region lies in the drainage basin of the Colorado, though many of the smaller streams do not under ordinary conditions pay any tribute to that river, their waters being all evaporated or absorbed, except in rainy seasons. The chief affluents to the Colorado are the Gila, the Bill Williams, and the Colorado Chiquito. The main Colorado is navigated by steamboats for 600 miles, but abounds in shifting sand-bars. The water-supply over large areas of Arizona is mainly derived from deep natural wells and 'water-holes.' There are many evidences that this water-supply, probably never large, is now much smaller than in prehistoric times, there being in some districts extensive remains of abandoned aqueducts or irrigation-canals, where at present there is very little water to be had. There still exist a few Indian communities (Moquis towns, &c.), where the ancient agricultural semi-civilisation survives, though in a decadent state. The agricultural prospects of Arizona are good. It is believed that fully 10,000,000 acres of ground might be profitably irrigated. The country is in general extremely healthful; but in the SW. the summer heat is excessive, and malarial fevers are not unknown upon the bottom-lands of the Lower Colorado. The rainfall is scanty, 14-21 inches only being registered at Fort Defiance. The mean annual temperature at Tucson is almost 60°. Maize, barley, and wheat are the leading products. The Indians have from immemorial times cultivated a little cotton. The sugar cane has been successfully cultivated in the SW. Grazing is largely carried on, and in the watered districts sheep and cattle give rich returns. The vegetation of Arizona, though not luxuriant, comprises many trees and plants not found elsewhere in the United States.

The animals are mainly those of the Rocky Mountain region. The avi-fauna is rich, many Mexican birds occurring here either as residents or as visiting species. The 'Gila monster' (*Heterodermis horridum*) is remarkable as being the only known venomous species of lizard; and the 'horned toad' (a lizard) is very common.

Arizona is an important seat of gold and silver mining; the aggregate value of these metals produced from the organisation of the territory to the end of 1885 being over \$17,250,000. The product for the year 1885 was officially estimated at \$6,595,146. The precious metals are generally obtained from regular lodes, since the absence of a sufficient water-supply makes 'placer' and hydraulic mining for the most part unprofitable. Copper is also mined and smelted very largely. Coal has been obtained at various points. Rock-salt, lead, and other valuable mineral deposits are reported from almost every part of the country; but many of the most profitable mining enterprises are seated in the south-eastern districts. It has been observed that the richest mines of the precious metals are on a belt crossing the territory from NW. to SE. The territory is traversed from east to west by two

great lines of railway, of which the Atlantic and Pacific crosses in the northern central region, and the Southern Pacific Railway in the southern part of the country. The manufacturing interests of Arizona are for the most part connected with the mines. The crushing, milling, and amalgamation of ores is an important business. Ores rich in lead, and some others, are largely smelted, instead of being milled and amalgamated.

The principal towns are Prescott, the capital (pop. in 1880, 1836); Tucson, an old Mexican town (pop. 7007); Yuma, in the SW.; Tombstone, a silver mining centre, in the SE.; Phoenix; St John; Clifton; Globe; and Mineral Park—all mining camps of greater or less importance. Allusion has been made to the interesting old Indian towns, or pueblos, with their remarkable native semi-civilisation. In some instances these communities occupy a single large stone-built house several stories high.

This region was first visited by Spaniards in 1570, and their military post at Tucson was established in 1580. Considerable numbers of the Indians were Christianised and partly civilised by Spanish missionaries; but many of the half-civilised pueblo Indians have persistently refused to become Christians. The warlike Apaches and other wild native tribes for 300 years have given much trouble, and it was not till 1886 that the United States forces and the Mexican troops, acting conjointly in the frontier districts, gave the Apaches such a severe punishment, that their power to annoy the white settlers would appear to be for ever destroyed. Indian hostilities have from the first greatly interfered with the development of the country. After 1821 the country was a part of Mexico until 1848, when it passed to the United States under the treaty of Guadalupe Hidalgo. In 1853 the United States government effected the 'Gadsden Purchase,' by which a large area of land was obtained, most of which is now in Arizona. The territory was organised in 1863. In 1870 the population (other than tribal Indians) was 9658; in 1880, 40,440.

Ark of the Covenant. ARK OF THE TESTIMONY, or ARK OF JEHOVAH, among the ancient Israelites, an oblong box of acacia-wood, overlaid with gold within and without, two cubits and a half (3 ft. 9 in.) in length, one cubit and a half (2 ft. 3 in.) in breadth and height, in which was deposited the 'testimony,' the law of the ten commandments inscribed on two stone tablets. (In Hebrews, ix. 4, mention is also made of the pot of manna and Aaron's rod.) The lid of the mercy-seat was of gold, and had at each end a cherub, between which was the place of the Shechinah or visible manifestation symbolical of the Divine presence. Rings also were fastened to the ark, through which were inserted the staves by which it was carried, after being covered with a curtain of badgers' skins, with a blue cloth over all. Alike in the tabernacle and in the temple it was put into the 'most holy place,' into which, on the 'day of atonement,' the high-priest was to enter alone. The desire of the Israelites to have the ark in the army, and its solemn conveyance to the new capital in David's time, have been interpreted by some critics as revealing a somewhat sensuous conception of Jehovah as actually having his residence within it. This is but little in harmony with the spiritual idea of Jehovah found in the prophets, and it is significant that the ark is only once alluded to by them, and that in a very peculiar manner (Jer. iii. 16). The ark and the mercy-seat have long held an important place in the orthodox interpretation of Old Testament typology.

Professor Sayce in his Hibbert Lectures (1887)

pointed out a close parallel to the Israelitish ark in the Babylonian *papakku* borne on men's shoulders in procession at festivals. These 'arks' filled an important place in the Babylonian ritual. They had all special names, and were the visible abodes of the gods to which they belonged. The *papakku*, however, was not the original form, but merely a Semitic development of the *ma* or 'ship' of the pre-Semitic Sumerians. The latter was furnished with helm, oar, and mast, thus pointing back to a hoary antiquity when the first worshippers who used them dwelt by the sea-shore, as did the inhabitants of the old Chaldean city Eridu, on the shores of the Persian Gulf—whence the religion of primitive Babylonian first spread. For the Ark of Noah, see DELUGE.

Arkansas (formerly pron. *Arkansaw*), a state of the American Union, is bounded on the N. by Missouri, on the E. by Missouri, copyright 1888 in U.S. Tennessee, and Mississippi, on the S. by Louisiana, and on the W. by Texas and the Indian Territory. by J. B. Lippincott & Co., N.Y. Area, 53,850 sq. m.—about that of England without Wales of which some 800 sq. m. is water-surface. The southern limit is the parallel of 30° N. lat., and the northern boundary for the most part is on the parallel of 36° 30'. The Mississippi River washes nearly all the eastern border of the state. The extreme east and west limits are respectively 89° 40' and 94° 42' W. long. Nearly all the country is well timbered. Along the eastern border of the state, for more than half its extent from the north, lies a strip of rich alluvial and swampy land, 60 miles in average breadth, and limited westward by Crowley's Ridge, a prominent feature of the country. A similar low and wet tract is traversed by the lower Arkansas River. The southern half of the state contains great areas of yellow and loamy land of Tertiary age, interspersed thinly with tracts of red clays and hills of iron-ore. West of the Crowley's Ridge region is a considerable breadth of gray silty prairies. In the west of the yellow Tertiary loams are large patches of 'black prairie' of Cretaceous age. The west and central portions of the state form a broken hill-region of Tertiary origin. Great prairies of red loam and clay soil prevail in the W. and NW. Towards the north is the Ozark mountain-region, a broken country of high hills and ridges. The soils, though of extremely various character, are mostly good throughout the state. The coal measures very extensively underlie the surface, and coal crops out at many points; but thus far it has not been much wrought. The quality of the Arkansas coal is reported to be excellent. Silver-bearing galena and zinc appear to be abundant, and iron-ores exist in vast amounts. The villages of Hot Springs in Garland county, and Eureka Springs in the NW. are celebrated health-resorts. The novaculite, or hone-stone, of this state is extensively wrought and exported. The Mississippi, Arkansas, Red, White, St Francis, Ouachita, and other navigable rivers afford excellent facilities for the cheap transportation of goods. In the eastern alluvial region, especially towards the north, occur several large but shallow lakes, which were formed during the great earthquakes of 1811.

Agriculture is the leading pursuit in Arkansas, and cotton is the great staple of production. Maize is also very largely produced, and considerable quantities of oats and wheat are harvested. Live stock, wool, tobacco, pork, and dairy products are marketed, and their production is receiving a rapid extension. Much attention is also given to fruit culture.

The recent development of the railway system of the state has given far greater variety and enterprise to the agriculture of Arkansas than it had

under the old system of slave labour, when cotton, maize, and pork were almost the sole articles of production. Arkansas is still one of the leading states in cotton production, and it is asserted that if all the cotton-lands were worked to anything near their full capacity, this state might furnish as much of this staple as is now raised in the whole United States. There are still very large areas of undeveloped government land, and excellent improved lands can be purchased at low rates. Although malarial fevers and severe heat are to be encountered in the marshy and flat alluvial districts, the larger portion of the country has an agreeable and healthful climate, and few parts of the republic offer greater natural attractions to the immigrant. At Washington, in the NW. of the state, the mean annual temperature is over 61°, and the annual rainfall 54.5 inches; at Fort Smith, in the W., the rainfall is 40.36 inches. The extensive forests of Arkansas are becoming a source of wealth. Hard woods prevail north of the Arkansas River, cypress swamps cover a great part of the eastern alluvial districts, and in the south there are extensive areas covered with pine. In quality, variety, and accessibility, the timber of this state is hardly surpassed. Great attention has latterly been given to the black walnut timber of Arkansas, which is extensively used by cabinetmakers. Shingles, staves, and rough lumber are largely shipped. The manufacturing interests of this state (apart from the sawing of lumber and kindred operations) are for the most part little developed. Valuable water-power exists in the hilly and mountainous districts, but it is thus far not extensively utilised. Mills for the extraction of cotton-seed oil find profitable employment. The mineral resources of the state are believed to be very large, but they have been but little utilised. Lying outside the great currents of immigration, Arkansas has, until very recent years, preserved to a remarkable degree the character of a frontier country. Even the large extent of river navigation for a long time served to hinder the development of the country, since it discouraged the construction of railways, and as a consequence, great tracts of excellent land lying at a distance from the large streams are even now very thinly peopled. The old system of slave labour and of large holdings of land was not favourable to rapid material development. This region formed a part of the French colony of Louisiana, and was purchased, together with the rest of that colony, by the United States in 1803. The earliest French settlement was made at Arkansas Post in 1685. Arkansas was organised as a territory in 1819, and became a state in 1836. An ordinance of secession was passed by a state convention in 1861, and during the war which followed, this state was the scene of several active and important campaigns.

Public education has in recent years received much attention. Much care has been bestowed in some sections on the education of the freedmen and their children. Since 1880 there has been a large movement of colored immigrants from the older states. The light, yet fertile soil, and the warm climate of Southern Arkansas, seem specially attractive to this class of settlers, and the movement has been greatly encouraged by the planters of that section. The white population is almost entirely composed of English-speaking people of American birth.

The principal towns are Little Rock, the state capital (pop. in 1880, 13,138); Hot Springs, a celebrated health-resort, with copious thermal springs; Pine Bluff, Texarkana, Helena, Fort Smith, Eureka Springs, Arkadelphia, &c. Population of Arkansas (1820) 14,255; (1850) 209,897; (1860) 435,450; (1880) 802,525, of whom 591,531

were of white race, and the remainder nearly all of African or mixed descent.

Arkansas River, next to the Missouri the largest affluent of the Mississippi. It is 1514 miles long, rising in the Rocky Mountains, at an altitude of 10,000 feet, on the borders of Utah, and joining the 'Father of Waters' at Napoleon, 275 miles above New Orleans. Flowing generally through a level country, it presents but few obstacles to navigation. The principal difficulty is connected with its season and season being not less than 25 feet. It varies in width from 150 feet near the mountains, to about a mile in the sandy regions, and is practicable for steamboats, during nine months of the year, to a distance of 800 miles from its mouth. It divides the state which takes its name into nearly equal parts. Its most important tributary is the Canadian River.

Arklow, a seaport of Wicklow, 49 miles S. of Dublin, at the mouth of the lovely Avoca, which is crossed here by a bridge of nineteen arches. Near it is Shelton Abbey, the seat of the Earl of Wicklow. There are ruins of the castle of the Ormonds, destroyed by Cromwell in 1649, and traces of an ancient monastery. In 1798, a bloody encounter took place here between the government troops and the United Irishmen. Pop. (1871) 5178; (1881) 4777.

Arko'na, the N.E. promontory of the island of Rugen, in the Baltic. Its chalk-cliffs rise to a height of 177 feet, topped with a lighthouse, built in 1827, itself 78 feet high, from which the Danish island of Moen, 33 miles N.W., can be seen. Here stood the famous fortification (Slay. *Uckan*) so long impregnable, and the temple of the Wend deity Swantewit, the most sacred sanctuary of the Slavs of Northern Germany. It was destroyed, after a long struggle, by King Waldemar I. of Denmark in 1168. The remains of the *burg-ring* or wall still stand on the land side of the promontory.

Ark'wright, SIR RICHARD, celebrated for his inventions in cotton spinning, was born at Preston, in Lancashire, December 23, 1732. Of humble origin, the youngest of thirteen children, he was bred to the trade of a barber, and his early opportunities of cultivation were exceedingly limited. About 1750 he settled as a barber in Bolton, and for several years became also a dealer in hair. A secret process for dyeing hair, said to have been discovered by himself, increased considerably the profits of his trade. Very little is known regarding the first movements of his mind in the direction of mechanical invention. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767 he seems to have given himself wholly up to inventions in cotton-spinning. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair moving slowly in contact, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. No previously invented machinery had been able to produce cotton-thread of sufficient tenacity and strength to be used as warp. An invention indeed, by Mr Charles Wyatt of Birnigh gham, which was patented in 1738, but never succeeded, deprives Arkwright of the honour of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said,

was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time Arkwright was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Mr Jedidiah Strutt of Derby, the celebrated improver of the *stocking-frame*, who, in conjunction with his partner Mr Need, entered into partnership with Arkwright.

In 1769 Arkwright set up his first mill, driven by horses, and took out a patent for his invention. In 1771 he set up a larger factory, with water power, at Cromford, in Derbyshire. In organising his business, Arkwright showed remarkable energy and capacity; and he may be regarded as the founder of the factory system. In 1775 he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action, against Colonel Mordaunt backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that his description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and, in the following year, Arkwright published a pamphlet containing a statement of his case. In a new trial in 1785, he obtained a favourable verdict. The whole question, however, was brought finally before the Court of Queen's Bench, a few months after, when Arkwright's claim to the inventions patented was for the first time called into dispute. On the doubtful evidence of a person named Highs, or Hayes, combined with that of Arkwright's old assistant Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out Arkwright as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against him on the ground that his mechanical improvements diminished the demand for labour; and on one occasion, a large factory belonging to Arkwright was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. Arkwright, however, triumphed over all opposition. In 1790 he introduced the steam-engine into his works at Nottingham; and at the time of his death in 1792, the value of his property amounted to about half a million sterling. In 1786 he was appointed high-sheriff of Derbyshire; and on the occasion of presenting an address to the king, congratulating him on his escape from the knife of the maniac Margaret Nicholson, he received the honour of knighthood. A severe asthma had pressed upon him from his youth; and a complication of disorders, the result of his busy sedentary life, terminated a remarkable career at the comparatively early age of sixty.

Arlberg is the name of a crystalline mountain mass amongst the Western Alps, which forms the boundary between the Austrian provinces of Tyrol and Vorarlberg (the land before or beyond the Arlberg). The pass over this ridge, that on the route from Bludenz to Landeck and Innsbruck, is 5300 feet high, and is one of the most difficult in the Tyrolean Alps, though it is practically the only

one between the two Austrian provinces. The scheme for a railway with a tunnel through the Arlberg Alp took definite shape in 1880, and the railway from Innsbruck to Bludenz was opened 15th November 1884. The railway is through a singularly beautiful mountain country, and is much frequented by tourists to and from Italy. The main tunnel is 6720 yards in length, and cost £1,500,000.

Arles, one of the oldest towns in France, in the department of Bouches du Rhone, situated on the left bank of the principal branch of the Rhone, 15 miles from the sea, and 53 miles NW. of Marseilles by rail. It is famous for its Roman remains, including baths, a palace of Constantine, an aqueduct, and an amphitheatre (460 feet by 310 feet) capable of accommodating 25,000 spectators. The Champs Elysées were an early Christian burying-ground, and the museum contains many Roman and early Christian antiquities. The cathedral of St Trophimus (7th century) has a splendid doorway and ancient cloisters. Arles manufactures silk, hats, tobacco, brandy, soap, glass bottles, and railway wagons. The marshes which rendered the district unhealthy have been partially drained, and a canal has been formed which connects it with the harbour of Bone on the Mediterranean. Arelate or Arelas under the Romans was the seat of a prefect; afterwards, for some time, the residence of the Gothic king, Eurich; and in 879 the metropolis of the kingdom of Arelate (see **BURGUNDY**). It was a free city in the 12th century. In the early Christian times, several important synods were convened here (314, 354, 452, and 475 A.D.). Pop. (1881) 14,431.

Arles, a term used in Scotland and the north of England for a piece of earnest-money given in confirmation of a bargain or engagement, especially when a servant is hired. The ultimate origin of the word is the Latin *arher*, 'earnest-money,' 'part of the price paid down.'

Arlington, HENRY BENNET, EARL OF, was born at Arlington, Middlesex, in 1618, and from Westminster School proceeded to Christ Church, Oxford. During the civil war, at Andover he got a lifelong scar on the nose; afterwards at Madrid, as Charles's agent, he acquired an equally lasting pomposity.

England. Created Lord Arlington in 1663, and Earl of Arlington in 1672, he was not the most scrupulous member of the unscrupulous Cabal (q.v.). In 1674 he was impeached as a promoter of popery, a self-aggrandiser, and a betrayer of trust—in brief, as the 'conduit-pipe' of Charles's evil policy. The impeachment fell through; but Arlington found it desirable to exchange the office of secretary of state for that of lord chamberlain, and finally he retired to his Suffolk seat, Easton, where he died, 28th July 1685.

Arlon (anc. *Orolanum*), a town of Belgium, the capital of the province of Luxembourg, 27 miles WNW. of Luxembourg by rail. It is a neat and prosperous town, and has a considerable trade in corn, iron-ware, tobacco, crockery, and clay pipes. The town is mentioned as early as 870; the monastery of Clairefontaine, in the neighbourhood, is now a foudry. Pop. (1883) 7684.

Arm. The upper extremity of the human body may be divided into three portions—viz. the shoulder, the hand, and the intermediate shaft or arm. The latter consists of a upper arm and a forearm. In the upper arm there is one bone, the humerus, *h* (fig. 1). This bone presents a globular head, which articulates with and moves freely upon the scapula, *s*, forming the shoulder-joint. At the junction of the head and shaft of the humerus, there is a constriction termed the anatomical neck.

The shaft is cylindrical in its upper part, but becomes flattened and somewhat three-sided below. A short distance above its lower end, and on the inner side, a hooked process pointing downwards is not unfrequently found. This represents a process of bone forming a complete foramen in carnivorous animals, through which the main artery and nerve of the limb run. At the lower end of the shaft two articular surfaces for the bones of the forearm are found; the outer, rounded for the head of the radius, *r*; the inner, a pulley or trochlea for



Fig. 1.—Bones of the Human Arm:

h, humerus; *r*, radius; *u*, ulna; *w*, wrist-joint; *b*, *h*, hand; *s*, scapula; *c*, clavicle, or collar bone.



Fig. 2. Muscles of the Human Arm:

d, deltoid muscle; *c*, coracobrachialis muscle; *t*, *t*, triceps; *r*, *i*, extensors of wrist and long supinator of the hand; *k*, *h*, flexor of fingers and radial and ulnar sides of the wrist; and *l*, palm of the hand, or palmaris longus; *p*, palmaris brevis; *q*, palmar fascia; *u*, biceps.

the movements of the ulna, *u*. The bones of the forearm are two in number, the radius and ulna; the former being placed upon the outer, the latter upon the inner aspect of the forearm. By their upper ends, these bones articulate with the humerus, to form the elbow-joint; by their lower ends, with the carpus, to form the wrist-joint, *w*.

The shoulder-joint is constructed upon the plan of a ball and socket, the bones being held in position by a capsular ligament which is very loose, thereby allowing freedom of movement to a greater extent than in any other joint in the body. This gain in movement occasions a loss of stability, hence dislocations are frequent. For the most part, the head of the humerus is driven downwards into the armpit, this being the only side of the joint unsupported by muscles passing to be inserted into the upper end of the shaft. See **SHOULDER**.

A large triangular muscle, the *deltoid*, raises the arm from the side—a movement distinctively human; it is depressed by the *coraco brachialis*, the *latissimus dorsi* (the great muscle of the back), and the *pectoralis major* (the great muscle of the chest); in addition, it can be carried forwards and backwards by the action of these muscles.

(circumduction is the result of a combination of these movements.

The elbow-joint is hinge-like or ginglymoid. It is provided with strong lateral ligaments, and its movements are extension or straightening of the forearm produced by the *triceps*; flexion or bending by the *biceps*, *brachialis anticus*, and *supinator longus*. During the latter movement, the twist upon the trochlear surface at the lower end of the humerus causes the hand to be carried inwards in the direction of the mouth.

Joints called radio-ulnar are found between the bones of the forearm at their upper and lower extremities. The movements at these joints affect the hand, for it articulates with the lower end of the radius to which they are principally due. When the radius rolls forward upon the ulna, the palm of the hand is turned downwards—*pronation*; when it rolls backwards, the palm is turned upwards—*supination*. Each movement is produced by two muscles, which take their fixed points from the humerus and ulna.

A variety of the hinge-joint is found between the radius and carpus, for, in addition to flexion and extension, the hand can be drawn to the radial or ulnar borders of the forearm. These movements are effected by the *palmaris longus*, the flexors and extensors of the radial and ulnar sides of the wrist.

The upper extremity is supplied with blood by the continuation of the axillary trunk, the brachial artery, and its branches. The veins collect into large superficial trunks, which unite at the bend of the elbow, at which situation one is frequently selected for venesection, and then pass on to join the axillary, on the outside by the cephalic vein, on the inner side by the basilic. The axillary vein is formed by the junction of superficial vessels just mentioned with the deeper companion veins which accompany each branch of the brachial artery.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculo-spiral soon passing round the back of the upper arm to appear on the outside, and become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the term 'funny bone,' from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The median, as its name implies, keeps a middle course with the artery. See NERVOUS SYSTEM.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcrum or centres of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put, agility is of far greater moment than dead strength. See LEVER.

As far back as 1795, attention was first directed by White to the proportion between arm and forearm. Subsequent measurements have shown that a long humerus, and a still longer radius, are essentially ape-like characters, while the very reverse is typical of man, in whom the radius is shorter than the humerus. In anthropoid apes, the arm, from shoulder to wrist, is therefore longer than in man.

Extending the investigation to the different races of mankind, we find that there is very little divergence, except in the case of the African negro and Australian aboriginal, in whom the forearm is longer than in the white races. Notwithstanding this approximation to the anthropoid type, the arm of the negro, from shoulder to wrist, is a little shorter than that of the European. The explanation of this anomaly is found in the fact that the

humerus of the negro is shorter than that of the European, and thus two inferior characters a short humerus and a long radius—have combined to produce a superior one—a short arm. This affords an illustration of the fact that the proportions between human and anthropoid skeletons may approximate at one point while they diverge at another, even in the same type.

Armada, a Spanish word signifying simply an armed force, but applied specially to the great Spanish fleet fitted out against England in 1588. The king of Spain, Philip II., had resolved to strike a decisive blow at Protestantism by conquering England, which Pope Sixtus V. had formally made over to him. The ports of Spain, Portugal, and other maritime dominions belonging to him, had long resounded with the noise of his preparations, and the most eminent Catholic soldiers from all parts of Europe flocked to take a share in the expedition. The Marquis of Santa Cruz, an admiral of reputation and experience, received the command of the fleet, and the famous Duke of Parma of the land-forces. The latter had already gathered 30,000 men in Flanders, and merely waited the arrival of the armada to protect his crossing. As no doubt was entertained of success, the fleet was ostentatiously styled the Invincible Armada. When ready for sea, it consisted of 129 vessels, 65 of which were over 700 tons, and was manned by 8000 sailors, while it carried 19,000 Castilian and Portuguese soldiers, over 2000 cannon, and provisions sufficient to feed 40,000 men for six months. A squadron of 80 ships, only 30 of which were ships of the line, was all that Elizabeth had to oppose it by sea; but although the English fleet was much inferior in number and size of shipping to that of the enemy, it was much more manageable, while it was manned by 9000 of the hardiest seamen in Europe. Lord Howard of Effingham, a Catholic of great valour and capacity, took upon him as lord high admiral the command of the fleet; Drake, Hawkins, and Frobisher served under him; while a few ships, under Lord Seymour, lay off Dunkirk, to watch the Duke of Parma. Such was the preparation made by the English; while all the Protestants of Europe regarded this enterprise as the critical event which was to decide for ever the fate of their religion. Drake's daring attack on the store-ships in the harbour of Cadiz had already delayed the expedition, and it was further delayed at the moment of sailing by the death of the admiral Santa Cruz. Scarcely had it actually sailed under command of the Duke of Medina Sidonia, a seaman of but little experience, when a gale in the Bay of Biscay drove it for shelter into Ferrol. Some time was lost in refitting, and it was not till the end of July that the sails of the fleet were seen from Lizard Point, and the English beacons had flared their alarm all along the coast. The armada was disposed in the form of a half-moon, stretching seven miles from the one horn to the other. The Spanish admiral, instead of going to the coast of Flanders to take in the troops stationed there, resolved to sail directly to Plymouth, and destroy the shipping in the harbour. But Howard slipped out of Plymouth Sound, and hung with the wind upon his rear. He refused to come to close quarters, but attacked the Spaniards at a distance, pouring in his broadsides with admirable dexterity, and escaping at will in his swift and easily handled vessels out of the range of the Spanish shot. Galleon after galleon was sunk, boarded, or driven on shore, and the feathers of the Spaniard were plucked one by one. As the armada advanced up the Channel, the English still followed and harassed its rear, and the running fire continued throughout the week, until the Spaniards took shelter in the

port of Calais. At midnight Howard sent eight of his smaller vessels, filled like fireships with combustible materials, and ablaze, into the midst of the enemy. The Spaniards in panic cut their cables and stood out to sea, while the English ships pursued closely, and came up with them at dawn off Gravelines. Broadside after broadside the English poured into the towering ships of the armada, which in their turn were unable to do any great damage to them. At the close of six hours' furious fighting they found their best ships shattered to pieces and drifting with a north-west wind upon the sandbanks of Holland. More than 4000 men had fallen, while on the English side not a hundred men had been killed, and not a ship had been taken. The Spanish admiral in despair called a hasty council of war, in which it was resolved that, as their ammunition had begun to fail, as their fleet had received great damage, and as the Duke of Parma had refused to venture his army under their protection, they should return to Spain by sailing round the Orkneys, the winds being contrary to their passage directly back. The English ships were soon compelled to fall back from want of ammunition, with which they had been but stingily supplied through the ill-timed cheese-paring policy of the queen; but the storms of the northern seas broke upon the armada, and finished the work of destruction. When Howard fell back from the pursuit, on the 13th of August, there were still 100 vessels in the Spanish fleet; fifty-four only, and these in miserable condition, their crews dying of sickness and exhaustion, ever reached the ports of Spain. The rocks of the Hebrides and the western coast of Ireland were not more fatal to the ships than the hungry Islemen and Irish to their hapless crews. The seamen, as well as the soldiers who survived, were so overcome with hardships and fatigue, and so dispirited by their discomfiture, that they filled all Spain with accounts of the desperate valour of the English, and of the tempestuous violence of that ocean by which they were surrounded. The English queen struck a medal bearing the inscription, *Deus fluit, et Assipati sunt*, 'God blew, and they were scattered.' The story of the armada has been well told by Froide in the last volume of his History, and by Kingsley in the romance of *Westward Ho*; its opening chapter by Macaulay in a spirited ballad.

Armadillo (*Dasypus*), a genus of mammals in the order Edentata (q.v.). They are not, however, toothless, as the word Edentate would suggest, but provided with a variable number of simple molars, destitute of true roots, and distant from one another, so that those of upper and lower jaw interlock when the mouth is shut. Only in one case are there teeth which are not molars. The elongated snout bears at its tip the downward directed nostrils. The tongue is smooth, slender, and glutinous, but not long and extensible like that of the ant-eaters. The eyes are small and weak, probably in association with the burrowing habits of the animals, but the senses of smell and hearing are acute. The limbs are short and strong, and bear powerful claws, much used in burrowing. They they do very rapidly when in danger, while some, such as *D. apar*, protect themselves by rolling up into a ball and exposing only the armoured dorsal surface. This bony armour is indeed their most striking peculiarity, which distinguishes the genus from all other mammals except the allied *Chlamyphorus*. It consists of shields on head, neck, shoulders, and rump, and of movable cross bands of plates across the back. Even the tail may be thus armoured. In this way some of the armadillos have retained their foothold in the struggle with higher animals. Naturally timid and passive, they can, if forced, use their powerful claws in self-defence. They are

nocturnal in habit, and feed on insects, worms, fruits, roots, and sometimes on carrion. They are distributed from Mexico and Texas southwards to Patagonia, and occur in immense numbers in the



Three-banded Armadillo (*Dasypus apar*).

woods and pampas. The largest of the numerous species (*D. gigas*) is fully 3 feet long, exclusive of the tail, which measures a foot and a half more, while the smallest is not above 10 inches in length. Though all are eaten, the flesh of the more vegetarian species is particularly esteemed. Nearly allied is the small hairy *Chlamyphorus*, which has no shields, but a loose leathery armour formed of 24 cross bands of plates. In the pleistocene strata of South America, the armadillos are represented by giant fossil forms. See GLYPTODON.

Armadillo. See WOOD-LOUSE.

Armageddon, the great battlefield of the Apocalypse, in which the final struggle between the powers of good and evil is to be fought. Its name was undoubtedly suggested by that famous battlefield, Megiddo (Judges, v. 19), in the plain of Esdraelon, on which some of the most important battles in the history of Israel were fought, as the victories of Barak over the Canaanites, and Midian over the Gibeonites, as well as the defeat of Saul by the Philistines, and of Josiah by the Egyptians.

Armagh, the capital of County Armagh, 33 miles SW. of Belfast, is situated around and on a gentle eminence, whence its original name, Ard-Magha, 'the high field.' It is well built of limestone. The cruciform cathedral (184 by 119 feet), dating from the 12th century, is built of red sandstone, and is supposed to occupy the site of that erected by St. Patrick in the 5th century. A Gothic Roman Catholic cathedral occupies the principal height to the north, and the primate's palace that to the south. There are a college, a celebrated observatory, a county court-house, prison, public library (founded in 1771), fever hospital, district lunatic asylum, infirmary, and barracks for 200 men. It is the seat of the archiepiscopal see of the Primate and Metropolitan of all Ireland, who, before the disestablishment of the Irish Church, had an income of £12,087 a year. The chief manufacture is linen-weaving. Armagh, from 495 to the 9th century, was the metropolis of Ireland, the native kings living at Emania, 2 miles to the west of the city. It was then renowned as a school of theology and literature, its college being the first in Europe. After the Reformation, it suffered severely in the conflicts between the English and Irish; it contained only three slated houses in 1765, since which time it has been rebuilt. Under the Redistribution of Seats Act (1885), Armagh ceased to be a parliamentary borough. Pop. (1871) 8946; (1881) 10,070.

Armagh, a small inland county in Ulster, Ireland; bounded N. by Lough Neagh, E. by Down, S. by Louth, W. by Monaghan and Tyrone. Its greatest length is 32 miles, and breadth 20. Area, 512½ sq. m.; about one-half is under tillage, and the remainder in pasture, plantations, and bog, hill, and under water. The surface is hilly in the SW., and undulating in the centre, attaining in Slieve Gullion, in the SW., the height of 1893 feet. The country bordering upon Lough Neagh is low and boggy, and the Louth plain extends into the south end of Armagh. The principal rivers, navigable in their lower parts, are the Callan, the Tynan, the Upper Bann, flowing out of Down NW. for 11 miles before it enters Lough Neagh, and the Blackwater, which in its lower part separates Armagh from Monaghan. The rocks of Armagh are—Lower Silurian in the south and middle of the county; the trap of Antrim, with the underlying greensand, around Portadown; carboniferous limestone in the basins of the Blackwater and Callan; granite in the mountains of the SE.; and Tertiary strata bordering Lough Neagh. The soil is fertile, with a good deal of bog. The chief crops are oats, potatoes, wheat, turnips, and flax. The north and central parts of Armagh exhibit a dense population, low hills cultivated to the tops, hedgerows, orchards, and thickly scattered farmsteadings. Besides agriculture, linen and cotton weaving are the chief industries. Apples are largely grown. The county is mostly in the diocese of Armagh. It returns three members of parliament. The chief towns are Armagh, Lurgan, Portadown, and part of Newry. Pop. (1861) 190,086; (1871) 179,260; (1881) 163,177, of whom 75,709 were Roman Catholics, 53,390 Episcopalians, and 26,077 Presbyterians.

Armagnac, the old name of a district in the south of France, a part of Gascony now mostly included in the department of Gers. The soil is fertile, and its wine and brandy (*Eau d'Armagnac*) are well known. The inhabitants are noted for their simplicity, strength, and bravery; but are credulous and ignorant. The name *Armagnac* was borne by a band of soldiers who did good service in the early history of France against the English and Swiss. The family of the Counts of Armagnac, which ended in 1497, played an important part in French history.

Armatoles, the warlike inhabitants, since the 15th century, of the mountain districts in Northern Greece, especially in Macedonia, Epirus, and Thessaly. At one time, as robbers, they ravaged the neighbouring country; at another time protected its wretched inhabitants from other robbers in consideration of black-mail. The Turkish pashas, unable to subdue them, made terms with them, and tried to metamorphose them into a sort of military police, intrusting to their care the safety of the public roads, and dividing the country into districts, each under the supervision of a chief of these militia. But although the Armatoles frequently suppressed the brigandage of the Klepts, they still regarded them as brothers of common origin and faith, and shared with them their hatred for the Turkish yoke, however nominal it might be. The Turks at last alarmed at this sympathy, tried to substitute for the Armatoles the Mohammedan Albanians, who were the implacable enemies of the Greeks. The moment the Greek insurrection broke out, in 1820, the Armatoles joined the insurgents 12,000 strong, and they at least gained some glory in the war.

Armature is the term applied to the pieces of soft iron that are placed at the extremities or poles of magnets to preserve their magnetic power. See MAGNETISM.

Armenia, a high tableland in the upper valleys of the Euphrates, Tigris, Aras, and Kur, 400 to 500 miles long, by nearly the same breadth. In ancient times an independent country, it repeatedly recovered its independence down to the middle ages, although with varying boundary. It is now, however, distributed between Russia, Turkey, and Persia, and stretches, in its utmost extent, from Asia Minor on the W. to the Caspian Sea on the E., and from the Caucasus on the N. to the Murad Su on the S. The interior consists mostly of pastoral plateaus, 2700 to 7000 feet above sea level, crowned by conical heights or traversed by mountain chains, and culminating in Mount Ararat, 16,969 feet high. A chain of mountains, stretching from Ararat to the confluence of the two head waters of the Euphrates, divides Armenia into a northern half, containing the plateaus of Bayazid, Erzerum, Kars, Akhaldzikh, and Erivan; and a southern half, in which lies the plain of Murad Su, 4650 feet high at Mush. On the plateau of Erivan, the principal cones are Little Ararat, 12,840 feet high; Great Ararat, 17,212 feet; and Ala Göz (with three pinnacles), 13,436 feet. Surrounding Lake Van is the chain of the Ala Daghs, rising, in Tura Jehn, to 13,720 feet. To the east of the valley of the Aras, the plateau of Kara Bagh attains a height of 11,000 feet. The mountain-system of Armenia is mostly volcanic, in which trachyte and augite porphyry are mainly represented. The numerous cones are for the most part old craters. The volcanic nature of Armenia is still testified by its hot mineral springs, such as the sulphur springs of Tiflis, and by its earthquakes, which, in 1840, wrought the complete destruction of a village of 200 houses on Mount Ararat, and in 1859, of the town of Erzerum. The Murad Su or East, and the Kara Su or West Euphrates, form the head-waters of the Euphrates; whilst the Shatt, rising to the south of Van Lake, and an arm of the Diarbekr, rising in the Alinjik Daghs, constitute the head-waters of the Tigris. Other rivers are the Aras, the Kur, and the Tchouk. Of lakes, there is Van in Turkish, Gokcha or Sevan in Russian, and Urmia in Persian Armenia. Armenia is rich in metals, possessing mines of silver, lead, iron, arsenic, alum, rock-salt, and especially copper.

The climate is distinguished into a region of rains, with subtropical climate, embracing the valley of the Kur from Tiflis to the Caspian Sea and the valley of the Upper Tigris; a region of perpetual snow, which, in Ararat, except on the NW. side, starts as high as 14,000 feet, but elsewhere descends some 3000 feet lower; and an intermediate region of very various grades, including the plateau of the frontier mountains and the plateau chains, to a height of 12,000 to 13,000 feet. This third zone ranges from a South-European climate in the plain of the Kara Hissar, to a Mid-European climate, with harvest as late sometimes as August and September, in the mid-slopes of the frontier mountains. The plateaus—volcanic, dry, and singularly bare of wood have a very severe climate; the winters long and inclement; the summers short, very hot during the day, but always cold at night. The cold north winds, against which Armenia has no protection, encountering the east and south winds, give rise to the storms that render the navigation of the Black Sea coast so dangerous. Much the richest belt of vegetation is the broad valley of the Aras; but the marshes produced by the many irrigating channels make this the most unhealthy part of Armenia. There are, nevertheless, rich vineyard and orchards, fields of cotton, tobacco, rice, hemp, and flax. The high tablelands are chiefly pastoral, though a little corn is also cultivated.

The ancients distinguished *Armenia Major*, the larger and eastern half, bordering on Media and the Caspian Sea, on Mesopotamia and Assyria, from *Armenia Minor* to the west of the Euphrates. Turkish Armenia comprises, besides the old Armenia Minor, the vilayets of Van, Bitlis, Darsin, Erzerum, as also parts of the vilayets of Diarbekr and Charput. Russian Armenia, formerly Persian, forms the NE. part of old Armenia Major, and includes the governments of Erivan, Elizabetpol, and Kars, as also parts of the government of Tiflis. In this Russian division of Armenia are situated the three old monasteries—Echmiadzin, seat of the patriarch of Armenia, Haghpad, and Sanahine. Persia holds the SE. corner of Armenia Major in the province of Azerbaijan.

The Armenian is rather above middle stature, of darkish-brown or yellow complexion, with black, straight hair, large nose, wide rather than high forehead. He is of quick, adaptive intelligence, and specially qualified for trade. The women are often handsome, with erect carriage, regular features, and fine dark eyes. Only a part of the Armenians live in Armenia, most of them having been long dispersed all over the world. Yet is their essential national cohesion and indissolubility of national character almost as strong as is that of the Jews, though it has not had such unrelenting fires of persecution to anneal it. They belong to the Iranian group of the Indo-Germanic family. The Armenians, at the present day, are to be found in almost all Turkish provinces: in Russia, Persia, and India; in the great commercial cities of the Mediterranean; in the Austrian empire; at London, Manchester, and other capitals of Western Europe, occupying posts as money-changers, bankers, and merchants, though also as artisans and porters. Their number in Armenia itself is estimated at 1,000,000 at the most; in Persia and adjacent territories, 100,000; in European Turkey, 400,000; in Russia, 500,000; in India, 5000; in Africa, 5000; in Transylvania, Hungary, and Galicia, 16,000. Their total number is calculated at not more than 2,500,000. Among the foreign invaders domesticated in Armenia are the Turks, mostly engaged in agriculture; the nomadic Kurds; in the SE., the Tartars; Nestorians occupying the mountains of the Persian frontier, and speaking a Syriac dialect; Georgians, in the north. Greeks, Jews, and gypsies are also scattered throughout Armenia. The Armenians themselves are at home mostly shepherds and tillers of the soil, living in low, mud-built cottages, or underground dwellings, very meagrely furnished. The houses are built at the side of or round a small court-yard, the rooms with no apertures for light except into the yard. The cattle sometimes house with the family. In summer, the roof is utilised for smoking, eating, and sleeping. Marriages are arranged by the parents, and the women have a place very subordinate to that of men. So late as 1856 a wife might not speak to her sister-in-law for the first six months after marriage; nor to her mother-in-law for nine months; nor to her father-in-law for eighteen months; and when at last she might speak, it must be in a whisper; and the whisper survives even to-day in a London Armenian family. The women, seldom the men, weave carpets, silk and woollen stuffs, stockings, horse-coverings, shawls, &c., but especially lace, for which gold and silver threads are obtained from Russia. Long centuries of oppression and almost servitude have very much sapped the military habits and spirit of the people, though in the last Russo-Turkish war many Armenians distinguished themselves by their bravery. A large number hold high places in the Russian army, among the most distinguished being General Loris Melikoff.

History.—The Armenians called themselves Haik, whence *Hajastan*, the Persian name for Armenia; the name Armenia being conferred by the Medes, who applied this, the name of a single obscure clan, to the whole land. They have been known as a nation under this name since the time of Herodotus, and probably earlier. After being ruled by kings of their own, they fell successively under the Assyrian, Median, and Persian empires, retaining under the Persians their own princes, and merely paying tribute to the Great King. Having, under Digran or Tigranes, become the centre of an empire extending from the Orontes to the Caspian, Armenia was shattered by the Roman Lucullus, who penetrated to Artaxata at the NE. of Ararat (69 B.C.). Shapur, the second of the Sassanid kings, conquered Armenia, but under Diocletian it was recovered for Rome, and Tiridates the Great returned to his ancestral throne. This Tiridates having been converted to Christianity by St Gregory the Enlightener, Armenia became henceforward the bulwark of Christianity in Asia. Overrun by the Persian fire-worshippers, and, after the fall of Persia, by the Mohammedan califs of Bagdad, sometimes supported, sometimes abandoned, by the Byzantine emperors, and a prey to internal dissensions, Armenia yet re-emerged, in the 9th century, into a state of some importance.

In 885 A.D., Aschod I., of an old and powerful Armenian family, ascended the throne, with the permission of the califs, and founded the third Armenian dynasty—that of the Bagratids, who claim descent from King David of Israel. Under them Armenia was prosperous. The magnificent ruins of their capital at Ani, between Echmiadzin and Kars, still testify to the transitory splendour of their kingdom. In the 11th century divisions and internal strife again began to weaken the country; till at length the Greeks, having murdered the last monarch of the Bagratids, seized a part of the kingdom, while the Turks and the Kurds made themselves masters of the rest only one or two of the native princes maintaining a perilous independence. In 1242 the whole of Armenia Major was conquered by the Mongols. Leon VI., last king of Armenia, was taken prisoner by the Saracens, 1375, and died at Paris in 1393. In 1472 the eastern part of Armenia became a Persian province. Afterwards the western part fell into the hands of the Turkish sultan, Selim II.

The subsequent history of Armenia is that of devastation by the Mongols and the hosts of Timur, and of a long contest between the Ottoman sultans and Persia for the possession of that ancient kingdom. At length Russia approached from the north, welcomed by the Armenians as a suzerain preferable to either Turkey or Persia. Even before crossing the Caucasus and establishing herself in Georgia, Russia had interfered for the protection of the Armenian Christians. The Armenian patriarch Narses, too, had encouraged his people to look to Russia for protection. In 1827 the Czar wrested from Persia the whole of the upper valley of the Araxes, including Echmiadzin. On the conclusion of peace between Russia and Turkey in 1829, when the Russians retired from Erzerum, a multitude of Armenian subjects of Turkey followed them, electing to settle in Russian territory. According to Professor Bryce, Mr Creagh, and other travellers, the Armenians enjoy, under Russia, security of person and property, and protection for the honour of their families, such as was not vouchsafed to them by either Turkey or Persia. At the close of the Russo-Turkish war, by the Treaty of Berlin (1878) Ardahan and Kars were ceded to Russia, thereby adding 6687 sq. m. of territory, with a population of 271,151, to the district of Erivan already in

Russian possession. During the negotiation of the Berlin Treaty, Great Britain entered into a secret compact with the sultan, guaranteeing Turkey the integrity of her Asiatic possessions on condition that Turkey should effect reforms in their administration, and protect the Armenians from the Kurds and the Circassians. Turkey has utterly disregarded her part in this compact. The invasion of the Kurds in 1882, under their chief Obeidullah, a vassal of Turkey, was especially destructive of life and property to the Armenians.

In Russia, where they have found protection since the time of Peter the Great, the Armenians have formed communities at St Petersburg, Moscow, and in South Russia. The congregation of Armenian Mechitarists (q.v.) at Venice is celebrated. In London, Manchester, Amsterdam, and Marseille are Armenian merchant-houses. Armenians have been settled at Manchester since about 1840. In 1862 they had grown numerous enough to rent a private house for the celebration of divine worship. In 1870 they built an Armenian church, where divine service is conducted every Sunday, according to the ritual of the (non-united) Armenian Church, whose 'Catholikos' has his seat at Etchmiadzin. The number of Armenians in Manchester is about 120, their 35 merchant-firms negotiating the commerce between that city and Turkey, Persia, and the Russian Caucasus. There is also a pretty numerous Armenian community in London, composed for the most part of Armenian families from India. There are, besides, one or two Armenian merchants at Liverpool, and almost always a few Armenians studying at Edinburgh and Oxford.

The Church.—The earliest authentic accounts of the introduction of Christianity into Armenia date from the apostolical exertions of St Gregory (q.v.), who in the beginning of the 4th century converted King Tiridates and a large part of the people. In the same century Armenian Christians were found studying at Athens. Christianity was further confirmed in Armenia by Mesrob's translation of the Bible into the Armenian language in the 5th century. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians refused (491 A.D.) to accept the decisions of the Council of Chalcedon, and constituted themselves a separate church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself amongst them to a far wider extent than in the other eastern churches. Their greatest divine is Nerses of Klah, belonging to the 12th century. The Roman Catholic popes at various times, especially (1145, 1341, 1439) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognise the papal supremacy; but only in 1439 was union with Rome accepted by the scattered members of the Armenian Church outside of Armenia, on the basis that, while assenting to the dogma of the two natures, they should retain their national and ritual peculiarities. The Armenian Church was thus split up into a Catholic or united, and a Schismatic or non-united party, fanatically opposed to each other. The dogma of the pope's infallibility induced for a time dissension among the united party. The theology of the *Schismatic* or non-united Armenians attributes only *one* nature to Christ, and holds that the Spirit proceeds from: the Father alone; the latter doctrine, however, being held by it in common with the 'orthodox Greek Church,' although contrary to the theology of the western churches. With respect to the 'seven sacraments,' it entertains the peculiar notions that at baptism one must be sprinkled three times, and as often dipped; that confirmation is to be con-

joined with baptism; that the Lord's Supper must be celebrated with pure wine and leavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek Church in the number of its fasts, but has fewer religious festivals. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is in the new. Its sacerdotal constitution differs little from the Greek. The head of the church, whose title is Catholikos, and to whom the Armenian patriarchs of Jerusalem and Constantinople are subordinate, resides at Etchmiadzin, a monastery near Erivan, the ecclesiastical metropolis of the Armenian nation since 302 A.D., and claiming to be the oldest monastic foundation in the world. Incorporated in this monastery is a seminary or college for the education of Armenian priests, attended by about eighty young men from all parts of Asia Minor and Persia. This school is supported by the monastic revenues, which, from landed property in Erivan and Georgia, and from the contributions of the Armenian churches throughout the world, are said to amount to about £10,000 a year. Since 1830, Protestant missions, especially of the London Missionary Society, have been at work in Armenia. The American Foreign Missions have thirty-three Protestant congregations in Armenia, with more than 1800 members, many of them self-supporting, and supplied with native pastors.

Literature.—Previous to the introduction of Christianity by Gregory (300 A.D.), the Armenians had adhered to the Assyrian or Medo-Persian system of culture; but excepting a few old songs or ballads, no remains of that early period exist. After their conversion to Christianity, the Greek language and its literature soon became favourite objects of study, and many Greek authors were translated into Armenian. The earliest inscriptions are cuneiform. At a later period the Greek alphabet was used by the West, and Syriac by the East Armenians. In the beginning of the 5th century, St Mesrob, along with Sahak the Great, wrote the Armenian translation of the Bible, esteemed the highest model of classic style. The most flourishing period of Armenian literature extends from the 4th to the 14th century. The numerous Armenian theological writers and chroniclers of this era supply materials for a history of the East during the middle ages which have hitherto been too much neglected. These Armenian writers generally copied the style of the later Greek and Byzantine authors. In the 14th century literature began to decline, and few remarkable works were afterwards produced; but since their dispersion, the Armenians have ever cherished their national literature. Translations of several Greek authors, made in the 5th century, have been partly preserved, and contain some writings of which the originals have been lost—namely, the Chronicle of Eusebius; the Discourses of Philo; Homilies by St Chrysostom, Severianus, Basil the Great, and Ephraem Syrus. Among philosophical and theological writers may be mentioned: David, the translator and commentator of Aristotle, Esnik, and Joannes Ozniensis. The *Vite Sanctorum Calendarii Armeniaci* (Lives of Armenian Saints, 12 vols. Ven. 1814) contains many notices of the history of Armenia. A considerable stirring of intellectual and even literary activity has recently manifested itself both at Erivan and in Constantinople. The Armenian belongs to the Indo-Germanic group of languages, and though it is usually regarded as an offshoot of the Iranic branch, recent scholars of eminence have main-

tained its right to rank as a distinct branch, intermediate between the Iranic and European divisions of the group. It has certainly a very independent character, and has many peculiarities of structure. There are usually no distinctions of gender amongst nouns, and there are seven cases; while the verb has four conjugations and four tenses. In many respects the syntax of old Armenian, the language of literature, which is no longer a living tongue, resembles classical Greek; whereas the modern Armenian, split up into four dialects, contains many Persian and Turkish words. The Eastern dialect is, as might be expected, much purer than that of Constantinople. The language has great strength and flexibility; is consonantal and harsh to the ear. The alphabet, which has thirty six characters, usually said to have been partly formed on the Greek model by St. Mesrob, seems rather to have been adapted by him from the Palmyrene alphabet (see ALPHABET). There are grammars by Petermann (2d ed. 1872), Lauer (1869), and, of modern Armenian, Riggs (1856); and there are English-Armenian dictionaries by Aucher (1821) and Bedrossian (1879).

Appended is the verse John iii. 16, in old or ecclesiastical Armenian:

Ջօհ աշխատ սիրեաց Մտուած զաշխարհ
մինչև զկորին իւր միածին Լաւ . զի ամենայն
որ հաւատայ 'ի նա' մի կորցէ, այլ ընկալի
զկեանսն յաւիտենականս .

See Saint-Martin, *Mémoires sur l'Arménie* (1818); Carzou, *Arménie* (1854); Haxthausen, *Transcaucasia* (Leip. 1856); Creagh, *Armenians, Koords and Turks* (1880); Gattegny, *L'Arménie* (Paris, 1880); Troitzky, *The Ritual of the Armenian Church* (in Russian, 1875); Hamachod, *Chronological Succession of Armenian Patriarchs* (London, 1865); Karekin, *History of the Armenian Literature* (in Armenian, Ven. 1865 68); *The Divine Liturgy of the Armenian Church* (trans. by S. C. Malan, 1870); Nève, *L'Arménie chrétienne et sa littérature* (Louvain, 1887).

Armentières, a town in the French department of Nord, on the Lys, 12 miles WNW. of Lille by rail. It is well built and prosperous, having manufactures of cotton, linen, lace, leather, beetroot sugar, salt, and soap, and a considerable trade in grain. Pop. (1881) 23,639.

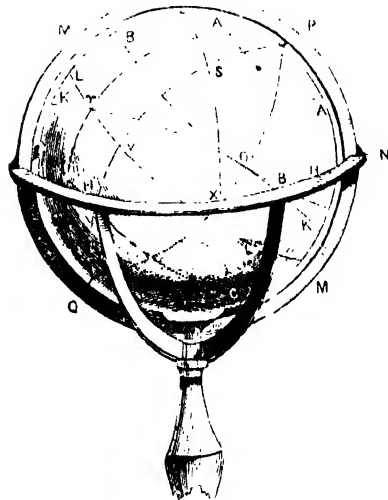
Armeria. See THURIFT, a genus of plants.

Armfelt, GUSTAF MAURITZ, born in Finland, 1757, during the war between Sweden and Russia (1788-90) displayed remarkable courage and spirit. He defeated the Russians near Fredrikshamn, and, as military representative of Gustavus III., concluded the peace of Vereli. In 1792 Gustavus, mortally wounded by an assassin, signed a codicil, intrusting the regency to his brother, Charles, during the minority of Gustavus IV., and naming Armfelt governor of Stockholm. Charles, however, destroyed the codicil; and Armfelt, conscious that his influence was waning, after a secret interview with young Gustavus, departed as ambassador to Naples. There he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency. The plot was discovered. Armfelt fled to Poland, and afterwards to Russia. He was condemned, during his absence, for high treason, and stripped of his goods and titles, while one of his associates, the beautiful Countess Rudensköhl, was subjected to the most brutal punishment. In 1799 Gustavus IV. received the crown at the age of eighteen, and Armfelt was restored to all his honours. Next in 1809 Gustavus was deposed, the ex-regent elected in his place, and

Armfelt appointed president of the Military Council. But shortly after, being implicated in the poisoning of the Prince of Angustenburg, he was obliged to flee to Russia, where, having received high honours, he died in 1814. See his Autobiography (Stock. 1830).

Armida, in Tasso's *Jerusalem Delivered*, was a very beautiful sorceress, employed to seduce Rinaldo, and other Crusaders, as they approached the Holy City. Her witchcraft was after a struggle overcome by Rinaldo, who then confessed his love to her, and persuaded her to become a Christian.

Armillary Sphere (Lat. *armilla*, 'a ring'), an instrument intended to give a just conception of the constitution of the heavens, and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahe making most of his planetary observations with the help of such an instrument. The armillary sphere is, however, now only used as an aid to instruction in astronomy, and in this respect is generally supplanted by the celestial globe. The object aimed at in the armillary sphere will be better understood by reference to the celestial globe represented in the diagram. Supposing the observer on the earth to be in the centre of the sphere, the earth on which he stands shuts out from his view the lower half of the heavens, or the part lying below the horizon, III. The hemisphere above him may be regarded as divided into two equal portions, an eastern and a western, by the meridian, MM, which passes through



the pole, P, and the zenith, Z, of which the eastern half is shown in the figure. The north pole is supposed to be elevated above the horizon, and its elevation is measured by the arc, NP, or the height above the north point; and the heavens appear to rotate round an axis, PQ, of which P is one extremity; the south pole, Q, the other extremity, being below the horizon. The meridian, MM, and the horizon, III, are the only circles which maintain a fixed position with regard to the observer. Of the other leading celestial circles, the equator or

equinoctial, LL, extending from the east to the west point of the horizon, the tropics of Cancer and Capricorn, respectively BB and CC, and the arctic circle, AA, although rotating with the stars, maintain the same position with regard to the horizon; while the ecliptic, KK, is constantly changing its inclination and position towards it. Circles which extend from pole to pole, cutting the equator at right angles, are called circles of declination. The circle which passes through the vernal equinox ☊ (see ARIES), is denominated the equinoctial circle; and that passing through the summer solstice, ☌ (see SOLSTICE), the solstitial circle. The circles just named, together with the antarctic circle, are represented by corresponding rings in the armillary sphere. If S be a star, the following are the names given to the arcs which determine its position with regard to these circles: ☊V, right ascension; SV, declination; SP, north polar distance; SZ, zenith distance; NS, altitude; $(180^\circ + NX)$, azimuth, reckoned from the south pole westward.

Arminius (Ger. *Hermann* or *Herman*), a famous prince or chief of the German tribe of the Cherusci, was born 16 B.C. In the years from 9 B.C. to 4 A.D., Drusus and Tiberius had penetrated into the north-west of Germany as far as the Elbe, laid out a number of military roads, erected fortresses in the country, and reduced the different tribes to such dependence upon Rome as virtually amounted to complete subjugation. The Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently and readily took service in the Roman armies. Thus Arminius and his brother Flavus had enrolled themselves under the Roman standards, and, as leaders of Cheruscan auxiliaries, had not only obtained Roman citizenship and the rank of knighthood in the country of the Danube, but had likewise acquired a knowledge of the Latin language, and a deep insight into the arts of war and policy as practised by the Romans. When Arminius returned home, he found the state of affairs considerably changed for the worse, through the unskilful despotism of the Roman viceroys, Quintilius Varus. He now conceived the plan of delivering his country from its oppressors. All the tribes and leaders as far as the Elbe were secretly summoned; Varus was lured into security, and induced to despatch portions of his army to different points, and, with the remaining portion, consisting of three legions and some auxiliaries and cavalry, to quit the highway. He was thus lured into the impassable districts of the *Teutoburg Forest*, in the north of Westphalia; an engagement took place, probably near Detmold, which lasted for three days. The result was the annihilation of the whole Roman army (9 A.D.). When intelligence of this defeat reached Rome, it excited the greatest consternation and anxiety. Augustus, who was now old and weak, is said to have yielded to transports of grief, repeating the words, 'Varus, Varus, give me back my legions!' The Germans, who had only their own liberation in view, prosecuted their victory no further; but when Germanicus (q.v.) assumed the command on the Lower Rhine, he resolved to crush the barbarians. In two successive campaigns, 14 A.D. and 16 A.D., he reduced Arminius to great straits; but he being recalled to Rome by the Emperor Tiberius, 17 A.D., the results of his victorious activity were lost. From this time no Roman army ever ventured to penetrate from the Rhine into the interior of Germany; and this result must be ascribed chiefly to the Cheruscan prince. Nevertheless, no sooner was the foreign enemy expelled, than internal feuds broke out, in the course of which Arminius was slain by his own kinsmen, in the 37th year of his age and twelfth of his leadership.

Compare Massmann, *Arminius* (1839); Wietersheim, *Der Feldzug des Germanicus* (1850); Böttger, *Hermann der Cheruskerfürst* (1874). A colossal statue of Arminius, by Baudel (q.v.), placed on a hill near the town of Detmold, was unveiled in August 1875.

Arminius, JACOBUS, or JAKOB HARMENSEN, the founder of Arminianism, was born in 1560, at Ondewater, in South Holland. After a preliminary education at Utrecht, he commenced (in 1575) a course of study at the newly founded university of Leyden, where he remained for six years and acquired a high reputation. In 1582 he went to Geneva, and received the instructions of Theodore Beza (q.v.), a rigid Calvinist. Here he made himself unpopular by the boldness with which he defended the logic of Peter Ramus (q.v.), in opposition to that of the Aristotelians of Geneva, and in consequence had to retire to Basel, where he was offered the degree of doctor of Divinity. At Basel he studied under Grynaeus. In 1586 he travelled into Italy; and on his return to Amsterdam (1588) he was ordained a minister. Shortly after this he was commissioned to defend the doctrine of Beza, regarding predestination, against the changes which the ministers of Delft had proposed to make on it. Arminius carefully examined both sides of the question, but the result of his study was, that he himself began to doubt, and at last came to adopt the opinions he had been commissioned to confute. Soon after, in the course of his exposition of the Epistle to the Romans, his treatment of the 8th and 9th chapters involved him in sharp disputes with his orthodox brethren. Still his views had not attained to that definiteness they subsequently acquired, for in 1603 he was made professor of Theology in the university of Leyden.

The chief opponent of Arminius was Francis Gomar (q.v.), his colleague in the university of Leyden. In the course of the year 1604, the latter attacked his doctrines, and from that hour to the end of his life, Arminius was engaged in a series of bitter disputes with his opponents. Arminius asserted, in substance, that God bestows forgiveness and eternal life on all who repent of their sins and believe in Christ; he wills that all men should attain salvation, and only because he has from eternity foreseen the belief or unbelief of individuals, has he from eternity determined the fate of each. On the other hand, Gomar and his party, appealing to the Belgic Confession and the Heidelberg Catechism, maintained that God had, by an eternal decree, predestinated what persons shall, as being elected to salvation, be therefore awakened to repentance and faith, and by grace made to persevere therein; and what persons shall, as being rejected (*reprobati*), be left to sin, to unbelief, and to perdition. See PREDESTINATION, PERSEVERANCE OF SAINTS.

While these fierce disputes were continuing, Arminius, who was not destitute either of friends or influence, was created *rector magnificus* of the university, but resigned the honour on the 8th of February 1606, having held the office only for one year. All the pulpits in Holland now thundered against him. At length, in 1608, Arminius himself applied to the States of Holland to convoke a synod for the purpose of settling the controversy; but, worn out with care and disease, he died on the 19th of October 1609, before it was held, leaving seven sons and two daughters.

There can be no doubt that Arminius himself was much less Arminian than his followers. He had not matured his opinion sufficiently to elaborate a complete system of anti-Calvinistic doctrine, though it is perfectly certain that the conclusions at which his disciples arrived—as stated in the famous 'Five Articles'—are the logical and legitimate results of

his teaching. Personally, Arminius was a faithful pastor and a good man, as even his enemies allow; his abilities were also of a high order; his thinking is clear, bold, and vigorous; his style remarkably methodical, and his scholarship respectable, if not profound.

After his death his followers gained strength, and boldly asserted their views, but still remained in a minority. In 1610 they presented to the assembled States of the provinces of Holland a 'Remonstrance'—from which they were styled 'Remonstrants'—which contained the following propositions: (1) That God had indeed made an eternal decree, but only on the conditional terms that all who believe in Christ shall be saved, while all who refuse to believe must perish; so that predestination is only conditional. (2) That Christ died for all men, but that none except believers are really saved by his death. The intention, in other words, is universal, but the efficacy may be restricted by unbelief. (3) That no man is of himself able to exercise a saving faith, but must be born again of God in Christ through the Holy Spirit. (4) That without the grace of God, man can neither think, will, nor do anything good; yet that grace does not act in men in an irresistible way. (5) That believers are able, by the aid of the Holy Spirit, victoriously to resist sin; but that the question of the possibility of a fall from grace must be determined by a further examination of the Scriptures on this point.

This last point, left as an open question, was decided by the Remonstrants in the affirmative soon afterwards (1611). Whereupon the Gomarists (Calvinists) put forth a strong 'Counter-remonstrance,' asserting plainly absolute predestination and reprobation. After several fruitless discussions, the States of Holland, in January 1614, issued an edict of full toleration for both parties, prohibiting at the same time the continuance of the controversy. The Counter-remonstrants refused to submit to this edict, and the strife soon became so furious, that in 1617, or soon afterwards, the Arminians found it necessary to guard themselves from personal violence by appointing a safeguard of militia-men (*Waardgelders*). The controversy now merged in the strife of party politics. The ambitious Maurice of Orange took advantage of the passions of the majority to crush his opponents of the republican party, whose leaders were adherents of the Arminian doctrines. Several Arminians were put to death, and others were imprisoned (Oldenbarnevelde, Grotius). In these circumstances, the Synod of Dort was held (1618-19), attended by selected representatives from the Netherlands, England, Scotland, the Palatinate, Switzerland, Nassau, East Friesland, and Bremen. From this convocation (January 14, 1619) the thirteen Arminian pastors, with the learned and eloquent Simon Episcopius at their head, were excluded. The doctrines of the Counter-remonstrants were embodied in ninety-three canons; the Belgic Confession and the Heidelberg Catechism were confirmed as authorities for the reformed churches of the Netherlands; and three hundred Arminians (chiefly preachers) were expelled from office. In consequence of this decision, the defeated party sought shelter abroad, but under Maurice's successor (1630) they were again tolerated in Holland.

Since that time, the Remonstrants (or Arminians) in Holland have inclined more and more towards freedom of thought on religious questions, and independence in church government. The rejection of all creeds and confessions; the free interpretation of the Scriptures; a preference of moral to doctrinal teaching; Arian views respecting the Trinity; the virtual rejection of the doctrines of original sin and imputed righteousness; and the view of the sacra-

ments as merely edifying forms or ceremonies—all these and other points of belief display the same tendency which is found in their church polity. The number of Remonstrants is now only about 5000, and is still decreasing. In 1809 they had 34 congregations with 40 preachers in Holland; but in 1880, only about 20 congregations. The largest society of Arminians is in Rotterdam, and numbers only 600 members.

Although the Arminians are thus dwindling away as a distinct body, their tenets respecting predestination have been adopted with greater or less modification by several other Christian denominations (see METHODISTS, BAPTISTS, MORISONIANISM); as well as by multitudes of the individual members of those churches whose formularies are Calvinistic (see CALVINISM). Arminian influence became marked in the Church of England after Laud's time (see LATITUDINARIANS, HALES); and a decided aversion to the harsher aspects of Calvinistic doctrine is characteristic not merely of the Broad Church, but of what is often called modern theology. Arminian views are also very prevalent in the Church of Rome. Most of Arminius's works have been published in Nichols's translation, and Brandt's *Life of Arminius* has been translated into English by Guthrie (1854).

Armistice, a temporary suspension of hostilities between two armies, or two nations at war, by mutual agreement. It takes place sometimes when both are exhausted, and at other times when an endeavour to form a treaty of peace is being made.

Armisticio, a territory of Venezuela, with an area of 7040 sq. m. It is bounded by the Venezuelan states of Los Andes, Zamora, and Bolivar, and on the S. and W. by the United States of Colombia. Armisticio is fertile and abundantly watered, several important tributaries of the Orinoco, with their numerous affluents, intersecting the territory in all directions; and, with the increased facilities for transport, greater quantities of its products are annually finding a market.

Armitage, EDWARD, an English historical and mural painter, was born in London, May 20, 1817, and studied in Paris, where in 1842 he exhibited his first independent work. In the following year his *Landing of Cæsar* gained a prize of £300 in London; and in 1845 and 1847 he carried off prizes of £200 and £500. After a year's study at Rome, he visited the Crimea during the war, and on his return produced two spirited battle-pieces. He was made an associate in 1867, and in 1872 a fellow of the Royal Academy, to which, in 1875, he was appointed lecturer on painting. Most of his contributions to the Academy exhibitions have been scriptural subjects; all have been marked by powerful composition, and by a breadth and boldness that largely atone for a want of warmth in the colouring. His mural paintings include a series of noble figures of Christ and the twelve apostles, executed for a Roman Catholic church in London.

Armorica (Celt. *arc-mor*, 'before the sea'), the country of the Armorici, who, in Cæsar's time, occupied the coast of Gaul between the Seine and the Loire. Later the name was confined to Brittany (q.v.).

Armour is a general term for the apparatus of personal defence, as distinguished from arms or weapons of offence. The commonest implement of defence in prehistoric and early historic times in Europe was the shield. The earliest known shields are of bronze, and circular, and were held in the left hand by a handle under the central boss. In addition to the shield, the early Greeks used greaves and helmets of bronze, and to these, in later times, a cuirass of breast and back plates was

added. The Romans added shoulder-guards to the cuirass, which was modelled to the bust, and furnished with a series of pendent plates, reaching almost to mid-thigh. It is not known when the tunic of interlinked rings, or coat of mail, first made its appearance in Europe. Flexible cuirasses were worn by the Roman *Hastati*, but there is no distinct evidence of their construction. Portions of

was bound to have as many coats of fence (*lorica*), helmets, shields, and lances, as he had knights' fees in his domain; and the freemen and burgesses were to have habergeons or *gambesons*, and iron caps. The Scots had not generally adopted the use of defensive armour, for at the battle of the Standard, in 1138, the Earl of Strathern is represented as saying: 'I wear no armour, yet they who do will not advance beyond me this day.' Towards the end of the 12th century, the round shield becomes rare, and the kite-shape gives way to the triangular or flatiron-shaped shield, and the conical helmet to the cylindrical and flat-topped form. In the first part of the 13th century, the hauberk and hose, or long *chausses* of mail, remained the usual body-armour of the knight; but in the second half of the century, the mail defences of the limbs began to be reinforced by portions of plate attached as shoulder-pieces, and elbow and knee pieces, to which were speedily added greaves or shin-pieces. The hauberk was made, in the beginning of the century, with a continuous coif for the head, and gloves not divided into fingers, but having an aperture in the centre of the palm. The coif of mail, which at the commencement of the 13th century was flat-topped, became round-topped in the second half of the century, and instead of it, the hood of mail, with a wide tippet which fell over the hauberk on the shoulders, was coming into use. Over the coif or hood, the great helm was worn in action, completely encasing the head, and perforated in front with small apertures for light and air. In the early part of the century, the cylindrical, flat-topped helm was the common form; in the middle of the century, the round-topped form prevailed; and by the end of the century, the top had assumed more of the form of a sugar-loaf. The armour was also extended from the man to the horse, which had a coverture of chain-mail fitting tightly to the head and neck, and falling loosely over the body.

The 14th century was the period of the greatest development of body-armour, marking the transition from the coat of mail to the panoply of plate. The knightly equipment at this period necessitated the wearing of four or five different casings or defences over each other. Below the chain-mail, which was still worn, the quilted gambeson was needed to soften the pressure; over the mail was the corselet, with other reinforcements of plate, and over all, a second quilted garment, which might or might not be covered by the surcoat, usually worn uppermost for the purpose of displaying the knightly emblazonment. The hauberk now terminates at the neck, which is defended by a gorget of scale or plate. An ample corselet protects the breast, and the shoulders, elbows, and hands have each their special defences, either of articulated plates or single pieces. The reinforcements to the chausses or hose of mail which protected the legs in the previous century, gradually give way to complete defences of plate, the greaves fitting to the knee-pieces, and these to the thigh-pieces, till in the latter part of the century the legs were completely incased in tubular *jambards*, or jointed casings of plate, which opened upon hinges on the outside of the leg, and fastened on the inside. The feet were inclosed in *sollerets*, or shoe-like casings, of articulated plates, the long-pointed toe of the *solleret* marking the second half of the century. Under the pointed or dome topped helm, the coif or hood of chain-mail is discarded for the *bassinet*, a high-peaked cap of steel, round the lower part of which is laced the upper part of the *mail* or tippet of chain-mail falling down over the neck and shoulders. The helm, when placed over the *bassinet*, completely covers the head and face; it is perforated with clusters of small holes for breathing,

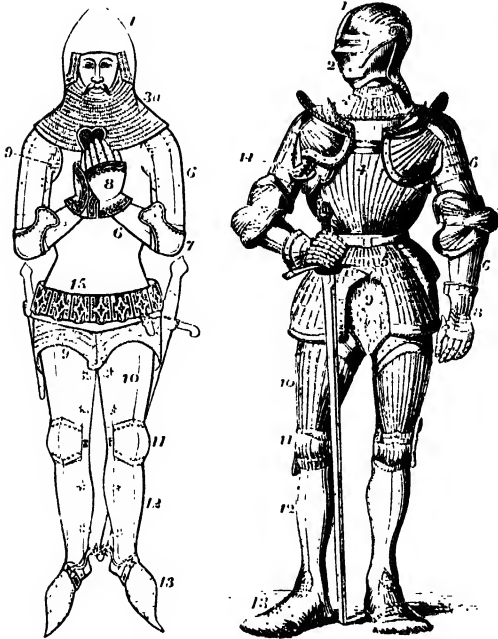


Fig. 1.—From Brass of Sir John de St Quantin, 1397: Fig. 2.—Complete Suit of Plate armour, beginning of 16th Century:

1 helmet; 2, visor; 3, gorget; 3a, email; 4, breastplate; 5, surcoat; 6, arm-pieces; 7, elbow-piece; 8, gauntlet; 9, hauberk; 10, thigh-piece; 11, knee-piece; 12, greaves; 13, *sollerets*; 14, lance-rest; 15, belt.

chain-mail, formed of small riveted rings interlinked together, have been found in the mosses of Sleswick, associated with articles of decoration, exhibiting the influence of Roman art of about the 3d century. It seems unquestionable that chain-mail was in general use among the Northern nations long before the crusades. The enthusiasm engendered by the Holy Wars, however, gave a general impetus to the adoption of this species of personal defence, and under the feudal system, which prescribed for every man the arms and armour conformable to his condition, the period of the principal development of body-armour was reached. Disregarding the equipment of the common mass of combatants—which generally consisted of a suit of leather or other material quilted or stuffed, or padded with cotton or waste, or studded or muscled with small plates or scales of iron—the suits of armour worn by the knights and nobles were of costly workmanship, and splendidly adorned. In armour, as in dress, the changing fashions of the different periods are strongly marked. At the time of the Norman Conquest of England, or about the middle of the 11th century, the armour consisted of a *hauberk* or tunic of mail for the body, hose of mail for the legs, a conical helmet with nasal, and a circular or kite-shaped shield. This continued to be the style of equipment throughout the 12th century. By the assize of arms of Henry II. in 1181, every knight

and for sight is furnished with a narrow cleft extending from temple to temple. Before the close of the century, the visored bassinet and camail were often used instead of the unwieldy helm. The shields were still triangular, but shorter than in the previous century. On the shield and surcoat were emblazoned the wearer's armorial bearings, and the military belt of this period, which confined the lower part of the surcoat, was often the most brilliant and costly part of the equipment, formed of elaborately worked plaques of precious metals, jewelled or enamelled, and furnished with pendants. The horses were almost as closely clad in plate as their riders; and in consequence of the weight they bore, a fall was often fatal to them both. In the 15th century, the development of plate-armour proceeded until, towards the middle of the century, body and limbs were completely enveloped in an articulated casing of iron plates.

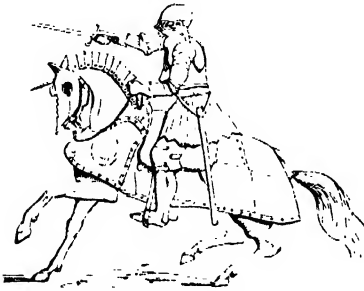


Fig. 3.—Suit of Armour presented by the Emperor Maximilian to Henry VIII., showing the Horse-armour.

Articulations fitted to the upper parts of the arm-plates were carried over the shoulders, and the joints were protected by fan-shaped projections. The body, below the breast and back plates, was enveloped in a skirt of wide, hoop-like plates called *tassets*. To the lower part of these there were attached a series of more loosely hanging plates called *tuilles*. The leg defences are angular in front, the long-pointed toes of the sollerets are shortened, and the gauntlets formed with articulating plates down to the points of the fingers. The bassinet and camail are being discarded in favour of the *salade*, a species of skull-cap, worn with a gorget and chin-piece separate from it. In this century, the introduction of gunpowder marks the period from which body-armour began to decline in importance, as being no longer proof against the new weapons of attack. The whole system of warfare was changed, tactics took the place of chivalry, and fortification of strong places against artillery superseded the system of iron-clad men. The full panoply of armour was still kept up for the joust and the tournament, but for actual service the tendency was henceforth in the direction of its disuse. In the 16th century, so prolific in changes, there was no longer the same uniformity of equipment. Instead of the long encircling skirt of hoop-like tassets, with tuilles attached, there is now a shortened skirt with a series of sliding and overlapping plates depending over each thigh, from the waist to the knee. The head defences are visored helmets or *salades* and morions. In the 17th century, officers and pikemen still retained the cumbersome body-suit of breast and back plates, with the short skirt of tassets and thigh pieces; and in the 18th century, body-armour had been reduced to a mere embellishment of the military parade.

The most authentic sources of information as to the changing fashions of body-armour in the middle

ages, are the miniatures of the illuminated manuscripts previous to the invention of printing, the Bayeux tapestry, and the monumental effigies and brasses of parochial and cathedral churches. The works of Grose, Meyrick, and Skelton may be consulted, or Hewitt's *Ancient Armour and Weapons in Europe*.

Armourer, formerly an armour-smith or maker of armour; now a skilled gunsmith in charge of the rifles, swords, and bayonets of the British army or navy. Each regiment of cavalry, battalion of infantry, and brigade of artillery has an armourer-sergeant who has been trained to clean and repair rifles and bayonets at the Small Arms Factory, Enfield. Should the introduction of a new weapon render it necessary, armourer-sergeants return to the same place for a further course of instruction. Every rifle in the possession of the regiment is inspected by them at least once a year, and put in order.

In the navy, the armourer is a first-class petty officer, who has, under the gunner, charge of all the rifles, pistols, sword-bayonets, &c., which he keeps clean and in order. He is assisted by seamen called the 'armourer's crew'; and all are skilled in the general routine of smith's work.

Armour-plates. See IRONCLADS.

Armpit, technically called the *axilla*, is the term applied to a space or hollow situated between the inner aspect of the arm and the upper part of the chest-wall. In shape it is pyramidal, the apex being directed upwards and inwards towards the root of the neck, while the base is directed downwards and outwards. The skin covering the base is characterised by its dark colour and the presence of hairs and sweat-glands of large size. The extent or depth of the space varies according to the position of the arm, being greatest when the arm hangs by the side, but gradually diminishes as the arm is elevated. In the latter position, the fore and hind boundaries become prominent borders, and are called the *axillary folds*. The large vessels and nerves for the supply of the upper limb pass through the space from apex to base, lying in close relation to the outer wall, and thus they are well protected from injury. Lodged in the space there are numerous lymphatic glands. These are apt to become inflamed, and lead to the formation of abscesses which, from the large size of the space and the resistant character of the tissues forming its base, may attain considerable proportions.

Arms, ARMORIAL BEARINGS, or ENSIGNS, devices borne on shields and banners by families, or by kingdoms, provinces, episcopal sees, or corporate bodies. See HERALDRY.

Armstrong, JOHN, physician and poet, was born about 1709 at Castleton, a pastoral parish in Liddesdale, Roxburghshire, of which his father was minister. He took the Edinburgh degree of M.D. in 1732, and soon after commenced practice in London. In 1736 he published a nauseous poem, *The Economy of Love*; in 1744 his principal work, *The Art of Preserving Health*, a didactic poem in four books. In 1746 he was appointed physician to the London Hospital for Sick and Lame Soldiers, in 1760 physician to the forces in Germany, whence he returned on half-pay in 1763, to resume practice. With Fuseli, the painter, he made a continental tour (1771); and he died from a fall in London, 7th September 1779. The friend of Thomson, Mallet, Wilkes, and other wits and writers of the day, Armstrong seems to have been a reserved, indolent, and splenetic man, 'who quite detested talk'; kind-hearted witual, and of frugal habits, having left £3000, saved out of a small and precarious income. His fame rests entirely on *The Art of Preserving Health*; his other works—

Benevolence (1751), *Taste* (1753), *Sketches or Essays* (1758), *Day* (1761), *Miscellanies* (1770), *A Short Ramble through France and Italy* (1771), &c. -- being now only known by name.

Armstrong, JOHN, physician and medical writer, was born 8th May 1784, at Ayres Quay, near Bishop-Wearmouth, where his father was superintendent of glass-works. He graduated M.D. at the university of Edinburgh (1807), commenced practice at Bishop-Wearmouth, in 1811 was chosen physician to Sunderland Infirmary, and, having greatly extended his reputation by a work on *Typhus* (1816), in 1818 removed to London, where his practice became extensive, and where, from 1819 to 1824, he was physician to the Fever Hospital. He died of consumption, 12th December 1829. See his *Life* by Dr Boott (2 vols. 1833). -- His son, JOHN ARMSTRONG (1813-56), in 1853 became Bishop of Grahamstown.

Armstrong, WILLIAM GEORGE, LORD ARMSTRONG, inventor of the Armstrong gun, was born in 1810 at Newcastle, where his father was a merchant. He was articled to a solicitor, and became a partner in the firm. But the bent of his mind lay in other directions. In 1840 he produced a much improved hydraulic engine, and in 1845 the hydraulic crane. In 1842 he brought to perfection an apparatus for producing electricity from steam. He was elected a member of the Royal Society in 1846; and shortly afterwards commenced the Elswick Engine-works, in the suburbs of his native city. This large establishment was at first chiefly employed in producing hydraulic cranes, engine accumulators, and bridges, but was soon to be famous for the production of ordnance. During the Crimean war, Armstrong was employed by the War Office to make explosive apparatus for blowing up the ships sunk at Sebastopol. This led him soon afterwards to consider improvements in ordnance, and he devised the form of cannon that bears his name. The essential feature of the Armstrong gun, whether rifled or smooth bore, breech-loading or muzzle loading, is that the barrel is built up of successive coils of wrought-iron, welded round a mandrel into a homogeneous mass of great tenacity, the breech being specially strengthened on similar principles. The actual results obtained by these guns, even of the earlier patterns, were almost incredible. An ordinary 32-pounder weighed 57 cwt.; Armstrong's 32-pounder weighed 26 cwt. The former required 10 lb. of powder as a charge; for the latter 5 lb. sufficed. The former would send a shot or shell 3000 yards; the range of the latter exceeded 9000 yards. In 1858 the Rifle-cannon Committee recommended the adoption of the Armstrong gun for special service; and the government proposed to secure the result of these experiments for the nation. Armstrong offered to the government all his inventions; and, till 1863, there existed a kind of partnership between the government and the Elswick firm, Armstrong being knighted in 1858, and appointed Chief-engineer of Rifled Ordnance. The Elswick firm, which in 1888 employed more than 13,000 workmen, has since supplied many foreign governments with guns.

The great reputation and commercial success of Armstrong depended, however, largely on his skill as a constructor of hydraulic machinery. Already a member of many scientific societies, he was in 1863 president of the British Association; and was instrumental in bringing about the appointment of the Coal Commission in 1866. He also took an active part in the inquiries concerning the operation of the Patent Laws. Cambridge and Oxford have conferred honorary degrees on Armstrong, who is a member of several foreign knightly orders.

In 1887 he was raised to the peerage as Baron Armstrong.

Army, a body of armed men, so organised and disciplined as to act together, be mutually reliant, and perform in unison the evolutions of the march and battlefield according to the absolute will of one man. An army is a movable engine composed of a vast number of individual parts or powers, arranged so as not only to act in concert, but to exert their whole aggregate force in any direction and upon any point which may be ordered or required. The organisation of an army is of two kinds, tactical and administrative. The former enables the leader of an army to transmit his orders to three or four subordinate commanders, who pass them on to three or four others under them, until, through a regular chain of responsibility, the original impulse is communicated to the private soldier (see *Tactics*). The latter, in a similar manner, divides the army into groups of gradually decreasing size, so that the men may be efficiently paid, fed, clothed, and armed (see *ARMY ADMINISTRATION*). The present article will treat only of the constitution and establishment of armies, and indicate their gradual historical development. Technical terms generally, as well as all the component elements of the army, in *personnel* and *material*, and the organisation and duties of the troops, will be found noticed under their proper headings; the tactical positions of an army are defined below.

Ancient Armies. The earliest regular military organisation is attributed to Sesostris, who flourished in Egypt about sixteen centuries B.C. This extraordinary conqueror divided Egypt into thirty-six military provinces, and established a sort of militia, or warrior caste, to each member of which he allotted lands for the support of himself and his family. With this army he overran Asia as far as India, and from the Ganges to the Caspian. After him, little further progress was made in military art until the Persian empire arose. Its soldiers introduced the mass-formation, with cavalry in intervals of squares; but the most important feature of the Persian organisation was the establishment of what was practically a standing army, divided as garrisons throughout the conquered provinces, and under the control of military governors distinct from the satraps. In time of war this standing army was augmented by a general levy which included the tributary nations, and therefore resulted in a heterogeneous collection of barbarous and undisciplined peoples; a source of weakness which caused the defeat of Xerxes' numerically powerful army. In Greece, it was not a standing army, but a sort of national militia, that gained Marathon, Plataea, and Mycæ. The leading men in each state paid attention to organisation and tactics in a way never before seen. The Lacedæmonians invented the Phalanx (q.v.), a particular mass-formation for foot-soldiers; and to this the Athenians added lighter troops to cover the front and harass the enemy in march. Their cavalry also were efficient and alert. The charge of the Athenian army at Marathon showed the crowning excellence of their rapid system of attack; and Miltiades, their leader, is said to have first invented the 'double step,' to increase the momentum of a phalanx when rushing on the enemy. The Thebans introduced the column formation, which, being deeper and narrower than the phalanx, was intended to pierce the enemy's line at some one point, and throw them into confusion. Philip, the father of Alexander the Great, established in Macedonia the world's second standing army; and, as a further change, made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use

ARMY

afterwards, with a few exceptions, annually renewed until its incorporation in the Army Discipline Act of 1879 (see ARMY DISCIPLINE). In 1691 the Commons sanctioned a vote of 65,000 men, but on the return of peace in 1697 this force was reduced to 19,000; in the war of the Spanish Succession, the troops at one time numbered over 200,000, but they were again reduced, after the peace of Utrecht, to 19,000. Although the strength of the army has since steadily increased, these fluctuations have continued. The forces raised to 74,187 in 1745 were reduced to 18,857 after the Rebellion; the strength of 245,996 necessary in 1812 had fallen to 71,790 ten years after. The elasticity which permitted these enlargements and contractions was obtained by varying the number of battalions in a regiment, of companies in a battalion, or of men in a company. During the half-century which followed the last date, the actual number of regiments varied but little. Five cavalry and thirty-five infantry regiments were added in the reigns of the first two Georges; and the necessity of organising a corps of gunners for the defence of Gibraltar and other fortresses led to the formation in 1715, under the Board of Ordnance, of two companies of artillery, which received a regimental constitution the following year, although its officers were not regularly commissioned until 1741. Fifty engineer officers also were appointed in 1717; but seventy years elapsed before privates were enlisted and that arm became a corps. It was also at first under the Board of Ordnance; and hence it is that the Artillery and Engineers are still called Ordnance Corps. The outbreak of the French Revolution found the service at a very low ebb. The laurels gained in the earlier wars of the century had been tarnished in America, where two British armies had surrendered; the ranks were largely filled with pardoned criminals and released debtors; and the system of billeting caused endless complaints from soldiers and civilians alike. In the Peninsula, the army was permanently organised in divisions, and the commissariat and transport were brought to great perfection. But these services were afterwards reduced along with the army, which fell from 246,000 to 72,000, and the result was the miserable state of unpreparedness which was discovered when the strain of the Crimean war came.

Recent Changes. This struggle revealed many defects in the organisation of the British army; but for many years little of lasting value was done towards remedying these defects, beyond an improved method of admission, by examination, of candidates for Her Majesty's commission, and some small amelioration in the position of the privates. An English military critic could still say that 'there was no such thing as a definite English brigade, divisional, or army corps organisation; if war came, the whole had to be evolved from a force of brave men with muskets or field-guns, but destitute of all else.' Other events and considerations occupied the public attention. Still, the Indian rebellion, the second and third China war, and the Abyssinian expedition did not allow the subject to fade altogether from the public mind. So, when the mighty events of the Franco-German war of 1870-71, and the lessons to be derived from them, burst upon Europe, they fell in England upon a soil not unprepared, and acted as a great impulse towards a real reorganisation of the British army. The work since then has been kept steadily in hand by the War Office, under successive ministries, both Liberal and Conservative. Mr (afterwards Lord) Cardwell began it in 1871, under Mr Gladstone; Colonel Stanbury continued it during Lord Beaconsfield's administration; and

Mr Childers, during Mr Gladstone's second tenure of office, practically completed the work, by his measure bearing date, July 1, 1881.

To Mr Cardwell is due, in the first instance, the introduction of the principle of localisation of the military forces, the linking of battalions, and the admission of short as well as long service—the first steps towards the creation of an efficient reserve and the abolition of the purchase of commissions by officers. Long service (21 years with the colours) was previously general; but any soldier could leave at the end of 12 years. If he did not, he was re-engaged, with a penny a day extra pay, an allowance of some £3 to £5 in lieu of a free kit, and the certainty of a pension at the end of other 9 years if he conducted himself well. His pension could be increased by a penny a day for each good conduct badge acquired during that time; thus 1s. 5d. a day was often obtained for life after 21 years' service. Short service means a period of 12 years, divided into two periods of 6 or 8 years with the colours, and 4 or 6 years in the reserve. No re-engagement is allowed, except for non-commissioned officers and a few men specially recommended as likely to make in time good non-commissioned officers. Men of the Household Cavalry, the band of the Royal Military College, the Corps of Ordnance Artificers, and boys, serve for 12 years with the colours, and are only in exceptional cases permitted to re-engage. In case of war, all soldiers are liable to be retained for an additional year, and some, generally officers' servants, are allowed to remain after the lapse of their engagement, with three months' notice.

Mr Cardwell had in view the linking of battalions, which has since been completely carried out, and the more intimate connection of the militia with their territorial commitments. The abolition of promotion by purchase was a necessary step in this plan, in order that without injury to the positions which officers had purchased in their own battalions, they might be placed on one list for promotion with those of their linked battalion. In 1871, therefore, Mr Gladstone, in the face of strong parliamentary opposition, abolished the system of purchase, and the localisation scheme was initiated by the establishment of brigade depôts.

By the new organisation the Militia came more into the foreground. The ranks are now composed of much the same material as before, but they gain by being in more direct contact with the line, and the status of their officers is improved. They are now under military law, and when opportunities occur, sit on courts-martial with officers of all branches of the service. Formerly they were nominated by the lord-lieutenant of the county; since 1871 they have been appointed, though without an examination as yet, by the Secretary for War and the Queen. Many officers now enter the army through the militia by a special examination.

In comparing the new system of linked battalions with the old regimental system, it is necessary first to remember that the infantry counted 109 regiments of the line, beside the Rifle Brigade.

Of these 109 regiments, 25 had 2 battalions	= 50 bat.
The 60th had 4	= 4 "
The remaining 83, each 1 battalion	= 83 "
The Rifle Brigade had 4	= 4 "

141

These were now so reorganised as to produce 71 regiments (linked battalions). Or, in other words, many of the former 109 regiments disappeared, and by uniting, in many cases, two one-battalion regiments (linking them, as it was now technically called), 71 regiments of two (or more) battalions were formed. But these did not, for the most part, remain two-battalion regiments; two or more

battalions were added from the militia. In these new regiments the first and second battalions are line battalions, except the former 60th (now King's Royal Rifle Corps) and the old Rifle Brigade, in each of which the first four battalions are regulars of the line; any subsequent battalions are militia-men. Volunteer regiments are now likewise affiliated, with the same regimental districts, to these regiments, without, however, forming parts of these regiments, or bearing consecutive numbers of battalions: thus the King's Royal Rifle Corps (the old 60th) has 10 volunteer corps, all belonging to Middlesex and London, attached to it.

The rule for these new regiments of linked line and militia would seem to demand the existence of four battalions each. In some cases, however, the *Army List* informs us that the 4th battalion is 'not yet formed.' A few, like the Queen's Own Cameron Highlanders, have only 2 battalions; others have 5, and even 6; and the old Rifle Brigade, now the Prince Consort's Own, has 9 battalions of line and militia, to which 11 volunteer battalions are affiliated.

In place of the former numbers of regiments, now no longer applicable, territorial designations were chosen in preference, and some of the old and popular names of regiments are now only preserved, in parenthesis as it were, at the side of the territorial designation; thus the Lothian Regiment (Regimental District No. 1) is also, and by preference, called the Royal Scots; the Royal West Surrey Regiment, also the Queen's; the East Kent Regiment, also the Buffs. In this way an approach to the old mode of distinction has been kept up. The regiment recruits chiefly in the territory from which it takes its title, called the 'Regimental District.' Its depot always remains in that district, and local volunteers are attached to it.

The *Army List* still shows numbers for the cavalry regiments. Nor has any attempt been made to link this arm to the Yeomanry, which falls into two districts for auxiliary cavalry, the first having its headquarters at York, the second at Aldershot. There are also, independently of Yeomanry, some Light Horse Volunteers and Mounted Rifle Volunteers, partly attached to corresponding infantry volunteer corps. Also, not linked are: the Foot Guards, the Channel Islands Militia, the Royal Malta Fencible Artillery, the two West India Regiments, the Armourer Sergeants Corps, the Commissariat and Transport Corps, and the Ordnance Store Corps. The Engineers and Artillery have had militia and volunteers attached to them more recently.

The new arrangements as to short service produce gradually for the British army an element which it long wanted, an efficient Reserve. And on the two occasions when the reserve men were called out—viz. in 1878, on a prospect of war with Russia; and in 1882, when many of these reserve men took part in the Egyptian campaign, the results are considered to have justified the anticipations conceived of this new plan. The corps of Old Pensioners, formerly the only reserve force, is now allowed to die out.

Some important steps have been taken to improve the material of which the rank and file of the army is composed. Desertion, from which the British army has suffered more than the armies of the continental powers, where the men have less facility of escape, has on the whole been rather decreasing, more especially since the abolition of bounties in 1870. 'Branding,' technically called 'marking,' with the letters D. or B. C. (Deserter or Bad Character), by tattooing with needles and Indian ink, not by burning, as was generally supposed, was abolished in the year 1879. No substitute has been found for it to prevent re-

enlistment of soldiers discharged for bad conduct; but a better class of recruits has been obtained by a slight rise in the daily pay, and desertion checked by the introduction of deferred pay, consisting of an addition of £3 for each year of a man's service, payable on going into the reserve, or otherwise completing his service. The punishment of flogging was abolished in 1880.

The distribution of regiments into divisions and army corps, which previously was wanting, has been completed, at least on paper. The actual regiments have been told off; and in 1887 it was announced that arrangements had been made for maintaining two army corps and a division (6 regiments) of cavalry at fighting strength. Thus about 66,000 men, with 180 guns, are to be ready to embark immediately on the outbreak of hostilities. These troops are independent of those already abroad; and the battalions composing these two army corps will be those next on the roster for foreign service, whose strength will not be much below the war establishment. This state of things did not exist at the outbreak of the South African and Egyptian wars. Some battalions had their complement of seasoned men; others required reserved men or volunteers from other regiments to swell their numbers. The Reserves amount to over 52,000 men, half of them trained soldiers; the other half, men from the militia reserve, who take a double bounty, and thereby render themselves liable to be called to the colours under the same conditions as the men who have served their time in the regular army. As to artillery, the militia and volunteer artillery are considered sufficiently good to garrison the home forts, but cannot provide field artillery. It is intended to have a siege-train always ready at Woolwich. Great progress has been made as to the organisation of the Transport Service, and during the recent Egyptian campaign a post office corps was added, with much advantage to the army in the field. Experiments have been made in reconnoitring by means of captive balloons, and in transmitting information by carrier-pigeons. Field telegraphs have been used in all recent expeditions, and the telephone has been tried on outpost duty. Volunteer corps have been invited to enrol cyclists to act as orderlies and messengers, and excellent results have been obtained from preliminary experiments. The conveyance of troops by sea has also been provided for: plans for embarkation, transport, and disembarkation lie ready at the War Office, and the capacity of all steamships fit for carrying troops is known to the Admiralty. A vanguard for the First Army Corps may be said to be comprised in the garrisons of Gibraltar and Malta.

The great distinction between the British army and that of almost every other state in Europe, is that the service is *voluntary*. The subjects of the crown engage, by free choice, to serve in the army for a definite number of years. In the rare cases where forced service by ballot is obtained, it is in the militia, not the regular army (see MILITIA).

In the following table, relating to the official year 1887-88, it is shown of what component elements the British army now consists. The militia and the volunteer corps are not here included.

	BRITISH ARMY VOTED		1887-88.	Total British Army.
	Colours.	India.		
Horse Artillery.....	1,730	1,806		3,536
Cavalry, including Household Cavalry..	13,430	5,670		19,100
Artillery.....	21,065	10,214		31,279
Engineers.....	6,313	353		6,666
Infantry, including Foot Guards.....	87,100	53,648		140,757
Colonial Corps.....	2,931			2,931
Departmental Corps..	6,127			6,127
	138,785	71,001		210,486

in the army or reserve belongs to the militia up to his fortieth year. The country has been divided into fifteen military districts, with sub-districts and 'circles' as in Germany. The number of army corps is 17, with the army of the Caucasus (7 divisions of infantry and 1 of cavalry) in addition. The irregular troops are supplied by the Cossacks, who give military service in lieu of taxes, and comprise about 190,000 men, chiefly cavalry. The want of barrack accommodation leads to a great deal of billeting, and many men stationed in country districts see their officers only in summer, when they are assembled for training in large standing camps.

Italy. The Sardinian law of conscription forms the basis of the Italian military system, and all are liable from 18 to 40. Substitution is allowed in the case of brothers, and one-year volunteers are accepted. Contingents are divided by lot into two classes, one enjoying unlimited furlough, and the other serving eight years in the army, four in the active militia, and the rest of their time in the local militia. In infantry regiments three, in cavalry regiments five years only are served with the colours; the remainder, as a rule, being spent on furlough. The kingdom is divided into five 'zones,' and, in direct opposition to the Prussian principle, recruits are drawn from all zones for each regiment.

Of the other military powers of Europe, the army of Belgium (1886), including the staff and all arms, rank and file, numbered 48,222 men, besides the *Garde Civique*, 30,954; Denmark (1885), 50,522, including the extra reserve of 14,000; Netherlands (1885), 65,568 in Europe, and 31,627 in the East Indies; Spain (1886), 142,455, with 39,924 in the colonies; Sweden (1886), 40,146, besides the conscription troops, 131,108, and the militia, 16,198; in Norway the troops of the line are about 12,000 in peace, and in time of war not more than 18,000 without the consent of the Storting; Switzerland (1886), 117,179, and the *landwehr*, 84,046; Turkey (1885), 158,959, raised by the mobilisation of March 1886 to 475,000. Details of organisation are considered under the names of the several countries; and reference also may be made to Sir Charles Dilke's *European Politics* (1887).

The following table presents an approximate comparison of the military resources of the great powers of Europe.

APPROXIMATE COST.

		All Arms.	Each Man.
	302,000	100,000	£9,500,000
	524,000	1,750,000	26,500,000
Germany	450,000	1,676,000	17,300,000
Great Britain	210,000	670,000	19,500,000
Italy	210,000	902,000	10,300,000
	400,000	2,300,000	20,500,000

* It is estimated that about 1,000,000 more will be added to the effective strength of the Austrian army by the *Landsturm* law of 1886.

UNITED STATES ARMY. At the commencement of 1861, the United States army consisted of only about 14,000 regular troops. In various successive levies by the president during the civil war (1861-65), as many as 2,653,062 men had been called out—nearly one-fourth of the entire population of the Northern States. After the war, the standing army was steadily diminished; and by a law passed in June 1874, it is provided that there shall be no more than 25,000 enlisted men at one time. That force is distributed amongst 25 regiments of infantry, 10 of cavalry, 5 of artillery, and 1 battalion of engineers. The actual enlisted strength of the regular army in June 1886 was 24,442, each soldier costing about £278. The country is divided into

three military divisions. Each state is also supposed to have a militia, in which all men from 18 to 45 should be enrolled; but in several states the organisation is imperfect. The organised militia numbers slightly over 91,000 of all ranks; but the number of citizens who in case of war might be enrolled is estimated at over 6,700,000.—See *A Military Dictionary and Gazetteer*, by Captain T. Wilhelm, U.S.A. (Philadelphia, 1881).

ARMY ADMINISTRATION.—The whole of the operations connected with the raising, clothing, paying, maintaining, and controlling of an army are included in the term army administration. The sovereign has the supreme command of the British army, and controls it in every way through the Secretary of State for War, who is responsible to parliament for his own acts and for the advice he gives. The secretary is the head of the War Office (q.v.), and is assisted by two under-secretaries, one permanent, the other parliamentary, but sitting in a different House from his chief. The sovereign's orders affecting organisation, entry into and retirement from the service, promotion, alterations in conditions of service, or, in fine, any fundamental matter of agreement between the sovereign and the soldier, are communicated by 'Royal Warrants' signed by the Permanent Under-secretary for war, and published when necessary. These warrants are also republished in the 'Army Circulars,' a monthly issue of orders (signed by the same functionary) dealing with minute details of allowances, supplies, arms and stores of all kinds, in fact any expenditure of money or material. Army Circulars are supplementary to the 'Revised Army Regulations,' and are incorporated in those books when a new edition is published. Orders connected with the *personnel* of the army, and not involving expenditure, such as training, discipline, medals, rewards, special promotions, &c., are published by the commander-in-chief, acting under authority from the Secretary of State, in monthly pamphlets called 'General Orders,' signed by the adjutant general of the army. They are supplementary to the 'Queen's Regulations and Orders for the Army,' and are included in the next edition of that volume. By the 'Army Regulations' and the 'Queen's Regulations,' everything connected with army administration is determined—alterations being dealt with by warrants, circulars, and orders, as above described. These latter are also published with the *Army List* for the month following their issue.

In the United States, the supreme command of all military forces is, in terms of the constitution, vested in the president. His representative is the Secretary of War, who is the declared head of the War Department.

ARMY AGENT, a person appointed by government to receive the pay of officers quarterly in advance and act as their banker. The officers draw their pay monthly in arrears from the agent, whose remuneration consists only in the use of the large sums thus always in his hands, and any private banking business that officers may give him. Every regiment has an agent, whose name appears in the *Army List*. Messrs Cox & Co., Craig's Court, London, are agents for nearly all the regiments of the British army. The payment of the soldiers is quite distinct from that of the officers, and is now no part of the agent's duties (see ARMY PAY DEPARTMENT).

ARMY CORPS, a miniature army composed of all arms of the service, under the command of a general, and complete with every requisite appliance for war. In the British army, the German model is very closely followed, and an army corps at war strength consists of 36,987 officers and men, 12,846 horses, 90 guns, and 1573 carts and wagons.

The details are given in the following table :

Composition.	Officers and Men.	Horses.	Carriages.
General and Staff	96	80	..
Three Divisions, complete	30,459	7348	54 900
One Brigade of Cavalry	2320	2177	6 78
CORPS ARTILLERY—			
Staff	21	16	..
3 Batteries Horse Artillery	513	546	18 30
2 16 pounder Field Batteries	490	316	12 20
Army Corps Ammunition Reserve	513	513	.. 90
CORPS ENGINEERS—			
Staff	7	5	..
1 Company and Field Park	236	95	.. 15
1 Pontoon Troop	339	243	.. 31
1 Telegraph Troop	179	109	.. 13
1 Troop Military Police	75	65	..
Veterinary Department	13	2	..
Chaplains' Department	2	1	..
COMMISSARIAT AND TRANSPORT			
Staff	7	3	..
Transport	770	1,009	.. 179
Supply	59	7	..
Bakery Train	195	3	.. 23
Ordnance Store Department	290	40	.. 30
MEDICAL DEPARTMENT—			
Staff	23	11	..
1st Line, 1 Bearer-company	78	6	.. 21
2d Line, 6 Field Hospitals	318	48	.. 74
Postal Department	44	3	..
Total	36,987	12,846	90

ARMY DISCIPLINE is maintained by the administration of military law as consolidated in the Army Act of 1881, which incorporates the main provisions of the Mutiny Act (q.v.) and the Articles of War (q.v.), and is brought into force, and amended if necessary, each year by the Army Annual Act. This last act also specifies the number of men to be maintained, and the prices to be paid in billets during the ensuing year; it must be passed before the 30th April, on which date the previous act lapses. Military law is regulated by the Rules of Procedure and Queen's Regulations, and by it the soldier is governed in peace and in war, at all times and in all places. It provides for minor breaches of discipline by the power of summary punishment (up to twenty-eight days' imprisonment with hard labour) vested in every commanding officer, and for graver offences by the constitution of courts martial with powers of sentence varying, according to the rank and number of the officers composing them, from forty-two days' imprisonment to penal servitude and death. At the same time every soldier has a right of appeal from his commanding officer's award to a court-martial, and no sentence of any court-martial can be inflicted without first being confirmed by an officer authorised to do so.

In the United States, army discipline is enforced under the provisions of a code of rules, entitled *Army Regulations and General Orders*, which indicate with great minuteness the duties and privileges of those in the service; giving particularly, under the title *Articles of War*, specific instructions for procedure in cases of infraction of discipline.

ARMY ESTIMATES.—Early each year the War Office sends to the Treasury a series of accounts, setting forth the probable cost of everything required for the period from April 1 to March 31 following. These accounts are called the *army estimates*. In preparing them, the Secretary of State for War applies to the heads of all the departments under him for detailed accounts of their probable requirements (the actual number of men being fixed each year by the *Army Annual Act*—see above); submits them to the Treasury; and, if approved, to the House of Commons. The various items are more or less sifted by the House;

and any one or more of them can be refused altogether, or granted in diminished amount. The amounts under four great headings for 1887-88 are shown above (see *ARMY*, p. 436).

In the United States, annual reports are forwarded by heads of departments to the Secretary of War, and are referred by the president to congress, whose duty it is to examine the details of the estimate, and appropriate from the public funds the sum voted. The average annual cost of the United States army is about \$50,000,000.

ARMY LIST, a list issued monthly by authority of the War Office, of all commissioned and warrant officers of the British army, including the Royal Marines, the Indian army, the Yeomanry, Militia, and Volunteers, whether on full or half pay; together with a list of the headquarters staff at the War Office, and of the staff of each general officer's command at home, in India, and in the colonies, and of the various educational, manufacturing, and other establishments, with other information. A full index, an obituary, a list of the changes gazetted during the past month, and of the last issue of royal warrants, army circulars, and general orders, complete the work. A similar but larger volume is issued quarterly by the War Office, in which, besides the lists of each regiment, the officers of the army are also arranged on a seniority list, with the dates of their commissions and birth.

In the United States, a similar annual publication, the *Official Army Register*, is issued by order of the Secretary of War, and includes a list of the general and regimental officers, and the officers of the various departments, with notices of their services.

ARMY MEDICAL DEPARTMENT, as recently reorganised under the name of the *Medical Staff Corps*, provides one or more medical officers, with several trained men, at every station where troops are quartered in time of peace, forming what are called 'station hospitals.' In large garrisons, the principal medical officer has also under him a quartermaster of the corps for supply duties, and a small number of *nursing sisters*. A surgeon-general represents the department at the War Office. Until 1887, army surgeons ranked as lieutenants on appointment, surgeons-major as majors, deputy surgeons-general as lieutenant-colonels, surgeons-general as brigadiers, and after three years' service as major-generals. All such relative rank was abolished, however, in that year, the change giving rise to great dissatisfaction in the department.

On active service, every battalion, battery, cavalry regiment, or other unit would have a medical officer from the army medical department attached to it, who would be assisted by the 16 battalion stretcher-bearers. Thus 47 medical officers would accompany every army corps, and, in addition, 4 complete Bearer-companies (q.v.), and 25 field hospitals, each for 200 patients; 9 provided with transport, so as to follow the army, and the others stationary at the base and on the lines of communication. Hospital ships would also form part of this department. Each movable field hospital has 7 medical officers, 1 quartermaster, 37 trained orderlies, 10 wagons for stores and equipment, 2 water-carts, 52 horses, and 22 drivers.

The Indian army has a separate medical department of its own, and its field hospitals have a larger establishment of trained orderlies—namely, 122.

ARMY PAY DEPARTMENT.—The financial secretary is the representative of the army pay department at the War Office, and under his supervision the accountant-general prepares the army estimates. The pay of all officers is sent to the army agent of their regiments, but that of

the men to the regimental paymasters, together with the money required to meet other expenses authorised by the finance regulations. There is one paymaster (captain or major) attached to each regiment of cavalry, battalion of infantry, or brigade of artillery; another, of higher rank, to each regimental district; and a 'district paymaster' at the headquarters of each divisional command—the last dealing with the payment of contractors for supplies, engineers' work, &c. The regimental paymaster distributes the money required for the weekly pay of the men to the majors of batteries or captains of companies, by cheque on the local bank, and accounts to the War Office monthly by a pay list containing a muster roll of the regiment, and vouchers for every other expenditure. The *paymaster-sergeant* is clerk to the paymaster.

The daily pay of staff-officers in the British army, in addition to allowances for horses, servants, and lodgings, which are not granted to regimental officers, is, for a lieutenant-general, £5, 10s.; major-general, £3; brigadier-general, £2; deputy-adjutant and quartermaster-general, £2 (assistant do., £1, 5s.); colonel on the staff, £1, 15s.; deputy assistant deputy-adjutant and quartermaster-general, assistant military secretaries, brigade-majors, and aides-de-camp, £1, 1s. The adjutant-general (£2700), quartermaster-general (£2100), military secretary (£2100), and any of the above serving on the headquarters staff in London, receive 'consolidated pay,' instead of daily pay and allowances. The regimental daily pay is as follows: Colonel, £1, 6s. to £1, 10s.; lieutenant-colonel, 18s. to £1, 1s. 9d.; major, 13s. 7d. to 18s. 6d.; captain, 11s. 7d. to 15s.; lieutenant, 5s. 3d. to 7s. 8d.; adjutant, in addition to pay as captain or lieutenant, 2s. 6d. to 3s. 6d.; quartermaster, 9s. to 10s. 6d.; regimental sergeant-major, 5s. to 6s.; master-gunner, 4s. 6d. to 6s.; company sergeant-major, 3s. 9d. to 5s. 4½d.; sergeant, 2s. 4d. to 3s. 4d.; corporal, 1s. 8d. to 2s. 8d.; private, 1s. to 1s. 9d., the higher rates in each case being for the mounted troops. These are the principal ranks and rates of pay; it should be added that an addition is made to the pay of certain officers after 3 and 10 years' service, and that privates receive 1d. a day for every good conduct badge earned. 'Field service allowance,' to supply field-kit, &c., according to rank, can be drawn in advance when ordered on active service.

ARMY SCHOOLS comprise only those for the school-tuition of soldiers and their children. Under MILITARY SCHOOLS will be found the Staff College, the School of Military Engineering at Chatham, the School of Musketry at Hythe, Garrison Classes, and the Royal Military College at Sandhurst. Under ARTILLERY, the Royal Military Academy, the Artillery College, and the Department of Artillery Studies, all at Woolwich, with the School of Gunnery at Shoeburyness, are alluded to. Chelsea Hospital is an asylum for veterans, not a school of instruction. The Royal Military Asylum (better known as the Duke of York's School) at Chelsea, and the Royal Hibernian School at Dublin, are orphanages for soldiers' children, not involving a military career for them. Under the supervision of the Director-general of Military Education, army schools are established in every regiment and garrison for soldiers and their children. Every recruit, after having learned his drill, must attend, at least five hours a week, for six months, or until he has obtained a fourth-class certificate for reading, writing from dictation, and sufficient arithmetic to enable him to keep and understand his accounts. Military subjects form no part of this education, except that the dictation generally takes the form of writing orders and

military correspondence. Before being promoted to corporal, a third-class certificate must be gained, and a second-class before promotion to sergeant's rank; while a first-class certificate is required before a soldier can be recommended for a commission. Voluntary attendance is encouraged as much as possible. Soldiers' children, if the parents are married with leave, are required to attend the regimental or garrison school without payment. Should the parents desire it, they may, however, attend any certified denominational school, but must then pay the school fees. An army schoolmaster (see WARRANT OFFICER) has charge of each regimental or garrison school, assisted by well-educated non-commissioned officers or soldiers, and, for the Infant School, by trained army schoolmistresses, with monitorships under them. District inspectors and sub-inspectors, ranking as captains and lieutenants respectively, conduct the examinations for certificates every half-year, and otherwise supervise these schools.

ARMY WORKS CORPS.—This is a collection of skilled artisans and civilian labourers temporarily enrolled for manual labour during military operations, under contract terminating with the exigency of the occasion. During the winter of 1854-55, the British army besieging Sebastopol found it impossible to get heavy guns, shot and shell, provisions, and general stores, up to the front along the only road, 8 miles long and in very bad condition, which connected their camps with Balaklava harbour. Horses and men from the fighting troops could not be spared to assist the transport troops, and therefore an army works corps, 3500 strong, was formed and sent out. The men were strong and efficient railway excavators, miners, and skilled artisans, and were chiefly employed in the construction of a railway from Balaklava to the heights outside Sebastopol. The projected railway from Snakim to Berber was commenced in 1885 by a similar body of men, but they did not bear the name of army works corps, nor have the same organisation.

Amongst the numerous articles on military subjects in this work will be found:

Adjutant.	Colonel.	Gunnery.	Reserve.
Aide de camp.	Column.	Infantry.	Rifled Arms.
Ambulance.	Com. under.	Lieutenant.	Sapper.
Artillery.	In chart.	Marine.	Sentry.
Articles of War.	Commissioned.	Military.	Squadron.
Artillery.	Commissions.	Schools.	Strategy.
Barracks.	Company.	Militia.	Tactics.
Batman.	Control.	Medicalisation.	Troop.
Battalion.	Department.	McNary Act.	Transport.
Battery.	Com-martial.	Ordnance.	Trenches.
Bayonet.	Division.	Pensions.	Troop.
Beaver-company.	Dragoon.	Picket.	Volunteers.
Billet.	Engineers.	Portoon.	War.
Brigade.	Enlistment.	Quartermaster.	War Department.
Camp.	Firearm.	Rank.	War Office.
Cannon.	Fort.	Regiment.	Yeomanry.
Captain.	Fortification.	Regimental.	
Cavalry.	Guards.	District.	

Army-worm, a name sometimes given to the grubs of a small black fly (*Sciara militaris*), very common in some European forests. The name refers to the strange habit of the caterpillars, which collect in large compact armies when about to pass into the pupa stage.

Arnaud, HENRI (1641-1721), pastor and successful military leader of the Waldenses (q.v.), was born at La Tour, in Piedmont, and died among his exiled brethren at Schönberg. In his retirement here he wrote his famous *Histoire de la Glorieuse Rentrée des Vaudois dans leurs Vallées* (1710). It was dedicated to Queen Anne, and has been twice translated into English.

Arnaud, ST. See ST ARNAUD.

Arnaud, ANTOINE, the greatest advocate of his time in France, was born at Paris in 1500.

Descended from an ancient and distinguished family of Auvergne, he strongly supported the claims of Henry IV. to the throne; and became advocate-general and councillor of state. His zealous defence of the university of Paris against the Jesuits in 1594 won for him a wide celebrity. He published a work against the Society of Jesus, and several treatises of a political character. The Jesuits accused him, unjustly, of being a Huguenot. He had twenty-two children, some of whom formed the nucleus of the Jansenists and Port-Royalists. He died 29th December 1619.

Arnauld, ANTOINE, known as 'the great Arnauld,' the twentieth and youngest son of the preceding, was born at Paris, February 6, 1612. Entering the Sorbonne, he was initiated into the scholastic theology, and soon conceived a life-long admiration for St Augustine. In 1641 he attained the dignity of doctor, and was ordained a priest. In 1643 he published a work, *De la Fréquente Communion*, directed against the Jesuit view that the mere reception of the sacrament sufficed, without repentance and preparation, and continued the contest with his *Théologie Morale des Jésuites*.

Arnauld now buried himself in seclusion for twenty-one years, but his pen was almost continuously active. In 1640 had appeared a posthumous work of Jansenius, Bishop of Ypres, entitled *Augustinus*, which laid down with a rigour equal to Calvin's the doctrines of predestination, the corruption of human nature, and the depravity of the will. It was specially addressed against the Jesuits, many of whom entertained Pelagian views of the freedom of the human will. The work was condemned by Pope Urban VIII. in 1641. Arnauld ventured to defend it against the papal bull, publishing a first and second *Apologie de Jansénius*. He also wrote a number of religious works of a non-polemical kind, and became the religious director of the nuns of Port-Royal des Champs, the famous convent of which his sister was abbess. In his retreat he was surrounded by a society of scholarly friends, 'the recluses of Port-Royal,' who lived near the convent. Pascal, Nicole, and others only less distinguished. Here they wrote numerous excellent works. Arnauld and Nicole conjointly the Port-Royal treatises on grammar, geometry, and logic, the last of which, *L'Art de Penser*, became a standard work both in France and elsewhere. In 1650 appeared what he conceived to be his best work, *L'Apologie pour les Saints Pères*. In 1655-56, for prudential reasons, he left his retreat at Port Royal; about the same time he was expelled from the Sorbonne and the faculty of theology.

In 1656 the war with the Jesuits was renewed by the great Pascal in the *Provincial Letters*—substantially a brilliant defence of Arnauld's position. In 1669 appeared the first volume of Arnauld's *Morale Pratique*, against the moral teaching of the Jesuits. Arnauld, who was a sincere Catholic, defended the doctrine of transubstantiation in his *Grande Perpétuité de la Foi* (1669-74); and he wrote two works to prove that Calvinism subverted morality and the teaching of Christ. After the 'peace of Clement IX.' (1668), Arnauld was presented to the papal nuncio and to the Grand Monarque; but under Jesuit influence, the king issued an order for his arrest. Arnauld hid himself for some time, but finally withdrew into Belgium (1679). Though praised for equanimity and gentleness, he was incessantly engaged in keen controversy, even with his friends; for he wrote not against his enemies only, but against Pascal, Domini, Nicole, his protector Pope Innocent XI., Descartes, and his old friend, Père Malebranche. He died at Brussels, 8th August 1694, and was buried in secret. Arnauld is eminent not merely as a theologian

and thinker, but as a writer of French. His style is clear and pure; and his works are amongst the first in which the scholastic and cumbrous methods of disputation are superseded by modern French precision and force. As a philosopher, he was one of the first to write against the doctrine of perception by ideas representative of the objects, and in some points anticipates Reid and the Scottish school. His indefatigable energy is well illustrated by the famous reply he made to Nicole, who counselled him to take rest: 'Rest!' answered Arnauld, 'shall we not have all eternity to rest in?' His works, in 45 volumes, were published at Paris (1775-83). See PORT ROYAL DES CHAMPS, PASCAL.

Arnauld, MARIE ANGÉLIQUE, the sister of the great Arnauld, was born in 1591. When little over eleven years of age she was made abbess of Port-Royal. At first careless, she became rigorously severe in the discharge of her duties and the conduct of her life, and by her example and influence speedily brought about a remarkable reformation in the character of the convent. Disapproving of the manner of her own appointment, she resigned her place as abbess, and spent some time in another convent; but in 1636 she returned to Port-Royal, and became prioress under her sister, who was now abbess. She died in 1661, ere the persecutions of Port-Royal (q.v.) began. See FRANCES MARTIN'S *Angélique Arnauld* (1873). Her niece, ANGÉLIQUE ARNAULD, was born in 1621. At twenty years of age she became a nun at Port-Royal des Champs. Nine years after, she was made sub-prioress. During the persecution of the Port-Royalists, Angélique Arnauld, by her piety and courage, sustained the spirit of the sisterhood. The whole family, male and female, were determined Jansenists, and none more so than Mother Angélique. In 1678 Angélique was made abbess. She died in 1684, leaving behind her as bright and beautiful a memory as any of her countrywomen. Angélique Arnauld wrote several works, the most valuable of which are the *Mémoires* of her aunt.

Arnauld, ROBERT ARNAULD D'ANDILLY, the eldest son of Antoine Arnauld, the advocate, was born at Paris in 1588. He quitted the bustle of the world for the solitude of Port-Royal des Champs, and made translations in beautiful French from Josephus, St Augustine, St Theresa, and others. He died in 1674.

Arnault, ANTOINE VINCENT, French poet, was born in Paris in 1766, suffered four years' exile as an Imperialist (1815-19), and died, secretary of the Academy, near Havre, 16th September 1834. A rigid classicist, he produced seven dramas—the best *Les Vénitiens* (1799), but all inferior to his *Fables et Poésies* (1812), and *Souvenirs d'un Scavénaire* (1833).

Arndt, ERNST MORITZ, German poet and patriot, was born in the then Swedish island of Rügen, 26th December 1769. The son of a former serf, he yet received an excellent education at Stralsund, Greifswald, and Jena, with a view to entering the ministry; but in 1805, after travelling over great part of Europe, he became professor of History at Greifswald. His *Geschichte der Leibeigenschaft in Pommern und Rügen* (1803) led to the abolition of serfdom; and in his *Geist der Zeit* (1807) he attacked Napoleon with such boldness, that, after the battle of Jena, he had to take refuge in Stockholm. He was able to resume his functions at Greifswald in 1810; but he resigned the following year, in order to become an active co-operator with the minister, Stein, and other patriots, in stirring up the national feeling of Germany and preparing to throw off the foreign yoke. His songs, poems, and fugitive writings, full of

energy and fire, contributed not a little to rouse and sustain the spirit of Germany before and during the war of liberation. His famous song, *Was ist des Deutschen Vaterland?* and many others, are sung wherever German is spoken. In 1817 he married a sister of Schleiermacher's, and in 1818 became professor of History in the new university of Bonn; but, aiming steadily at constitutional reforms, he was suspended in 1819 for participation in so-called 'demagogic movements,' and was not restored till 1840. He was elected a member of the German national assembly in 1848, but retired from it in 1849. He returned to Bonn, and continued in his fugitive writings to advocate the views of the German national party. Vigorous in mind and body, beloved and revered by the whole German people as 'Father Arndt,' he died at the age of ninety, 29th Jk. mxy 1860. His works comprise an account of the Shetland and Orkney Islands (1826); numerous political addresses to the German nation; some volumes of reminiscences; and his poems (2d ed. 1865). See German lives of him by Langenberg, Baur, and Schenkel, and an English one, with preface by Seeley (1879).

Arndt, JOHANN, a German Lutheran divine, was born at Ballenstedt, Anhalt, in 1555, and died at Celle, Hanover, in 1621. His *Wahres Christenthum* ('True Christianity') was translated into most European languages, and is yet popular in Germany. Its object is edification—the promotion of practical religion; and it is written with great warmth andunction, and in a strain of piety bordering on mysticism. It has been called the Protestant *Imitation*, and its author the Fénelon of the Protestant Church. There are two English translations by Boehm (1720) and by Jaques (1815).

Arne, THOMAS AUGUSTINE, Doctor in Music, one of the best and most pleasing of English composers, was born in London, 12th March 1710, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar; but the love of music was too strong to be restrained. Young Arne became skilful as a violin-player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterwards celebrated as Mrs. Gibber) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond*, which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas*; and afterwards his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1736); and after a successful visit to Ireland, was engaged as composer to Drury Lane Theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air, *Rule Britannia*, which was originally given in a popular performance, *The Masque of Alfred*, was of his composition, as was also the well-known setting of *Where the Bee Sucks*, written for a performance of the *Tempest*. Besides music for many long-forgotten works, he composed two oratorios, the opera *Eliza*, and another, *Artaxerxes*, in the Italian style; but his genius was better adapted to simple pastoral melody than to great dramatic compositions. In later life he enjoyed considerable reputation as a music teacher, his most distinguished pupil being Miss Brent. He died in London, 5th March 1778.

Arnee is a native name for the wild Buffalo (q.v.) of India.

Arnheim (anc. *Arenacum*; Ger. *Arnheim*), the capital of the Dutch province of Guelderland, on the right bank of the Rhine, 38 miles ESE. of Utrecht by rail. The manufactures include tobacco, woollen and cotton goods, soap, and

paper. The environs are exceedingly picturesque, forming a favourite residence of merchants of the Low Countries. Among its most remarkable buildings are the 'great church,' with interesting monuments, and the town-hall, whose grotesque carvings have gained for it the name of 'Devil's house.' Sir Philip Sidney died in 1586 at Arnheim; in 1813 the town was taken by the Prussians. Pop. (1884) 44,436.

Arnheim Land, a name formerly applied to a region in North Australia, or more properly in the northern territory of South Australia, so called from the ship of the Dutch navigators who discovered it in 1618.

Arnica, a genus of Tubulifloral Composites. The rhizome, leaves, and flowers of the Mountain Tobacco, formerly enjoyed much repute in medicine as a stimulant in paralytic affections, low fevers, &c. The flowers are still employed to yield a tincture which is of service as an external application to wounds and bruises. The plant yields a considerable quantity of tannin, resin, volatile oil, and a peculiar alkaloid (arnicin). The rhizome is perennial and crooked, the stem about two feet high, simple or little branched, with few leaves, bearing on the summit a head of flowers of a dark golden yellow, often two inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is found upon the Continent as far south as Portugal, and as far north as Lapland, but is not a native of Britain. There are a few North American species.



Arnica.

Arnim, HARRY, GRAF VON, born in Pomerania in 1824, from 1864 to 1870 was Prussian ambassador at Rome, where he backed up the anti-infallibilists during the Vatican Council. He was rewarded with the title of Graf, but, as German ambassador to France (1872-74), he fell into Prince Bismarck's disfavour, and, on a charge of purloining state documents, was sentenced to three months', to six months', to five years' imprisonment. He had, however, retired into exile, and died at Nice, 19th May 1881.

Arnim, LUDWIG ACHIM VON, a fantastic but original German writer of romances, was born at Berlin in 1781. After devoting some years to the study of the physical sciences, he began his career as an imaginative author with *Hollins Liebelchen* (1802). He was especially interested in the old popular poetry, and stirred up among his countrymen a warmer sympathy for it by the publication, along with the poet Clemens Brentano, of *Des Knaben Wunderhorn* (3 vols. 1808-19). In 1809 appeared *Der Wintergarten*, a collection of novels; in 1810, a romance, *Die Gräfin Dolores*; in 1811, *Halle und Jerusalem*, a humorous dramatic poem; and in 1817, *Die Kromwächter*, an historical novel. He died in 1831. His wife, BETTINA VON ARNIM, a sister of Clemens Brentano, was born in 1785 at Frankfurt, and married him in 1811. The great event of her early life was her enthusiastic attach-

ment to Goethe, whom she first saw in 1807, he being then nearly sixty. The correspondence, published under the title of *Goethes Briefwechsel mit einem Kind*, in 1835, and translated by Bettina into English, is mainly founded on fancy. Her later works were semi-political in character. She died at Berlin, 20th January 1859. See Löper, *Goethes Briefe an Bettina* (1879).

Ar'no, next to the Tiber the most considerable river of Central Italy, rises on Mount Falterona, an offset of the Apennines, at an elevation of 4444 feet above sea-level, and 25 miles N. of Arezzo. It flows 140 miles in a generally westward direction, till it falls into the sea, 11 miles below Pisa, where it once had its embouchure. At Florence it is 400 feet wide, but is fordable in summer; and so far, except in the summer, it is navigable for barges. The Italian poets speak of 'the golden Arno'; but, in truth, its waters have mostly the colour of *café-au-lait*. The Arno is noted for the rapid and destructive character of its inundations, the most memorable being those of 1537 and 1740.

Arnobius (1) the Elder, a teacher of rhetoric at Sicca, in Numidia, about 320 A.D. He became a Christian about 300, and died most probably in 327. He wrote, according to Hieronymus, to prove the sincerity of his faith to the bishop who was to baptise him, his seven books, *Adversus gentes*, in which he meets the objections brought against Christianity, but shows that his own theology was not free from Platonic-gnostic conceptions. His work has great value to the student of the religion of Rome from the materials it contains. The standard edition is that by Reifferscheid (1875). An English translation will be found in vol. xix. of the *Ante-Nicene Library*.—(2) ARNOBIUS the Younger was a bishop in Gaul in the second half of the 5th century. He wrote a commentary on the Psalms, which is still extant, and which shows traces of semi-Pelagian heresy. It is reprinted in the 53d vol. of Migne's *Patrologia Latina*.

Arnold OF BRESCIA, was a native of that town, and was distinguished by the success with which he contended against the corruptions of the clergy in the early part of the 12th century. He was educated in France under Abelard, and adopted the monastic life. By his preaching, the people of Brescia were exasperated against their bishop, and through him Arnold was cited before the second Lateran Council, and banished from Italy (1130). He retired to France, but experienced the bitter hostility of St Bernard, Abelard's opponent, who denounced him as an enemy of the church. He thereupon took refuge in Zurich, where he remained five years. Meanwhile, an insurrection against the papal government had taken place in Rome, and thither in 1143 Arnold repaired, and endeavoured to lead and direct the movement. He exhorted the people to organise a government similar to the ancient Roman republic, with consuls, tribunes, and equestrian order; but they were disunited and restless, and gave way to the grossest excesses. The city, indeed, continued for ten years in a state of agitation and disorder; but these violent struggles were subdued by Pope Adrian IV. (Nicholas Breakspear), who, feeling the weakness of his temporal authority, turned to the spiritual, and resorted to the extreme measure of laying the city under an interdict, when Arnold, whose party became discouraged and fell to pieces, took refuge with certain influential friends in Campania. On the arrival of the Emperor Frederick Barbarossa for his coronation, in 1155, Arnold was arrested, brought to Rome, and hanged, his body burned, and the ashes thrown into the Tiber. But his influence lived after him, and through his sympathetic insight into his country's needs, his

name is even yet revered and loved in Italy, though he left no record of his doctrines save in the heart of the people. His eloquence and disinterestedness are acknowledged even by his enemies, who are also his biographers, and who have, unintentionally perhaps, placed him in history alongside Savonarola and Rienzi. His life is the subject of tragedies by Bodmer and by Nicolini.

Arnold, BENEDICT, a talented American military officer, whose early brilliant exploits are obscured by his attempt to betray Copyright 1988 in U.S. by J. B. Lippincott Company. his native country, was born in Norwich, Connecticut, January 14, 1741. By nature reckless and fond of adventure, he ran away from home when fifteen years of age, and joined the provincial troops then engaged in the old French war, but soon deserted. At twenty-one he became a merchant in New Haven. On the breaking out of the Revolutionary war, he joined the colonial forces; accompanied an expedition of 'Green Mountain Boys' (Vermonters), which, under Ethan Allen, captured Fort Ticonderoga; and in 1775, led an isolated detachment of an invading army through the wilds of Maine to Quebec, in the unsuccessful siege of which city he bore an important part. Here he was severely wounded, and for gallant conduct was made a brigadier-general by the colonial congress. Retreating from Canada by way of Lake Champlain, he superintended the construction on its waters of a flotilla, which he handled with much skill at the battle of Valcour Island.

Arnold was of an imperious and violent temper, and was frequently in difficulties with his fellow-officers; and, though greatly admired by General Washington and others high in rank, he appears to have had bitter and influential enemies. In 1777 five of his inferiors in rank were promoted by congress over his head to be major-generals—a circumstance which may be presumed to have sown the seeds of his subsequent disaffection towards the colonial cause. Though greatly chagrined, he was induced by Washington to retain his connection with the army; and, when on leave of absence he heard of the invasion of Connecticut by Governor Tryon, he hastened to join the colonial forces, and was present at the battle of Ridgefield, where his horse was killed under him. For gallantry in this action, he was made a major-general.

In the same year Arnold was sent by Washington to aid in the military operations in eastern New York, and fought with his customary impetuosity in the battles of Saratoga (having his horse killed, and being himself severely wounded), and is credited with having contributed largely by his skill and bravery to the capture of the invading army under General Burgoyne. Disabled temporarily by his wound, he spent much of the winter of 1777-78 in the hospital at Albany, and on the retirement of the royal forces from Philadelphia in the following spring, he was placed in command of that city. Here he met and married the accomplished daughter of Mr Edward Shippen, at whose house the unfortunate Major André (q.v.) had been a welcome guest during Howe's occupation of the city; and through this marriage appears to have begun that fatal acquaintance which resulted in the death of André as a spy, and the disgraceful downfall of Arnold as a traitor.

In 1780 Arnold sought and obtained the command of West Point, on the Hudson River (one of the most important posts in the colonies), which, through a conspiracy with André, he agreed to betray into the hands of the British commander. On the capture of André, and the discovery of the plot, Arnold precipitately fled to the British lines, and was given a command in the royal army. In

1781 he led an expedition against his native state, during which New London was burned, Fort Griswold, on the opposite side of the river, taken, and the garrison massacred. After the close of the war, Arnold resided in London in comparative obscurity, where he died June 14, 1801. See the *Life* by Jared Sparks; and that extenuating his treason, by Isaac N. Arnold (1880).

Arnold, Sir Edwin, K.C.I.E. (1887), C.S.I. (1888), poet, born 10th June 1832, the son of a Sussex magistrate, and, after an education at Rochester and King's College, London, was elected a scholar of University College, Oxford. He won the Newdigate (1853) with a poem on *Belshazzar's Feast*, for a while was second master at Birmingham, and then became principal of the Government Sanskrit College at Poona. Returning to England in 1861, he joined the editorial staff of the *Daily Telegraph*; and to him was largely due the despatching of Mr George Smith to Assyria, and of Mr Stanley to discover Livingstone. His numerous works include *Poems* (1853); *The Indian Song of Songs* (1875); *The Light of Asia* (1879); *Indian Poetry* (1881); *Pearls of the Faith* (1883); *The Song Christal* (1885); and *Lotus and Jewel* (1888).

Arnold, Matthew, one of the greater modern English poets, and the Sainte-Beuve of English criticism, eldest son of Dr Arnold of Rugby, was born at Laleham, near Staines, 24th December 1822, and educated at Winchester, Rugby, and Balliol College, Oxford. He won the Newdigate with a poem on Cromwell in 1843, and next year graduating with honours was elected a fellow of Oriel in 1845. After acting for a few years as private secretary to Lord Lansdowne, he was appointed one of the Lay Inspectors of Schools in 1851, an office from which he retired in 1855. In 1857 he was elected professor of Poetry at Oxford. He was more than once sent by government to inquire into the state of education on the Continent, especially in France, Germany, and Holland; and his masterly reports, with their pregnant hints and downright statement of English deficiencies, when published in book form, attracted much attention in England. In 1883 a pension of £250 was conferred on him, and in the same year he lectured in the United States. He held an Italian order, which was conferred on him after he had for two years had charge of the young Duke of Genoa, while under education at Harrow. He died suddenly at Liverpool, 15th April 1888.

Arnold became known as a poet of classical taste and exquisite purity of imagination by the volume published under his name in 1854, consisting of new poems and selections from his two earlier volumes signed 'A.' In 1885 he issued a collected edition of his poems in three volumes. The English-speaking public in both the Old and the New World have long recognised Arnold as standing almost in the front rank of modern poets. Nowhere do we find greater dignity of thought and sentiment, greater distinction in manner and utterance. His verses have the stately calm and purity of marble, but with the faultlessness of an antique statue they have also something of its coldness and severity. His volumes contain nothing unworthy of him—he has always been his own severest critic—no other poet has sustained his flight with so strong and steady a wing. His lines never contain anything but what is essential; the redundant and the merely decorative find no place in poetry where the form is always on the same high level as the thought. Only once has he made an experiment for which his powers were inadequate or unsuited. He lacks the dramatic instinct, and his *Merope*, an imitation of an old Greek play, apart altogether from its being

an essay in a form that has long been dead, was doomed to failure from its lack of dramatic harmony and the sense of reality. As a critic, Arnold is only less eminent than as a poet. His criticisms on poetry contributed to the magazines and reviews did much to raise criticism in England to the level of a serious and almost systematic science, and it was doubly fortunate for English literature that such invaluable criticisms should be embodied in such sweet and lucid prose. Indeed, it would be difficult to overestimate the indirect benefit to our younger writers of having constantly before them such an admirable model and such a high standard for comparison. His literary judgments, pronounced from time to time in magazine articles, in prefaces to selections of poetry, or in occasional lectures or speeches, have long been received by the literary world with a respect much higher than that paid to the utterances of any other writer. His chief prose writings are *Essays in Criticism*, collected in 1865; *Lectures on the Study of Celtic Literature* (1867); *Culture and Anarchy* (1869); *Last Essays on Church and Religion* (1877); *Mixed Essays* (1879); and *Irish Essays* (1882). In his contributions to theology, *St Paul and Protestantism* (1870), and *Literature and Dogma* (1872), the reading public were no less startled by the audacious application of literary criticism to religion, than by the exquisite literary form so novel in works devoted to such questions.

Arnold, Samuel, composer, was born in 1740, and died 22d October 1802, having become organist to the Chappels Royal (1783) and to Westminster Abbey (1793). His *Maid of the Mill* (1765), *Prodigal Son* (1773), and other operettas and oratorios, are well-nigh forgotten, compiled as they mostly were from the works of his predecessors; and he is best remembered by his valuable collection of cathedral music (1790).

Arnold, Thomas, D.D., head master of Rugby, was born June 13, 1795, at West Cowes, in the Isle of Wight. In 1807 he was sent to Winchester, and remained there till 1811, when he was elected a scholar of Corpus Christi College, Oxford. Having taken a first class in classics (1814), he was next year elected a fellow of Oriel, and he gained the chancellor's prizes for the Latin and English essays in 1815 and 1817. As a boy, we are told, he was shy and retired; as a youth, disputations, and somewhat bold and unsettled in his opinions; but before he left Oriel, he had won the good opinion of a college which at that time boasted of such names as Copleston, Davison, Whately, Keble, Hawkins, and Hampden. He took deacon's orders in 1818, and the year after settled at Laleham, near Staines, where he occupied himself in preparing pupils for the university. In 1820 he married Mary Penrose, daughter of a Nottinghamshire rector, and sister of one of his earliest friends. Nine years were spent in this quiet life; he was preparing himself for the arduous post he afterwards occupied; he was developing his opinions, and he had also already commenced his great undertaking, the *History of Rome*. It was a period which he himself looked back upon with loving memories. His letters at this epoch reveal to us a fine ambitious spirit bending cheerfully to the task of tuition, more useful than glorious; they also prove to us that those views of a religious and political character which afterwards distinguished him, were maturing in the privacy of Laleham. In one he expresses, in a somewhat sportive and familiar manner, the great principle which he afterwards contended for with so much earnestness, that there should be a Christian laity, a Christian legislature, a Christian government; by which he did not mean a system of laws or government formed in the manner

of the Puritans, out of texts of Scripture rashly applied, but imbued with the *spirit* of the New Testament and of the teaching of Christ. It was at Laleham, too, that Arnold first became acquainted with Niebuhr's *History of Rome*. This was an era in his life. It produced a revolution in his historical views, and his own *History of Rome* was modelled, almost too faithfully, on that of the great German.

From Laleham he was called to undertake the arduous duties of the head-mastership of Rugby. On these he entered in August 1828. Without dwelling on the details of that system of public education which he perhaps carried to its perfection, we may take notice of the high tone, moral and religious, which he infused into the school. He had the tact to make himself both loved and feared. He guided with great dexterity the public opinion of the school. 'In the higher forms,' says his biographer, 'any attempt at further proof of an assertion was immediately checked. "If you say so, that is quite enough; of course I believe your word;" and there grew up in consequence a general feeling that it was a shame to tell Arnold a lie—he always believes one.' On one occasion, when he had been compelled to send away several boys, he said: 'It is *not* necessary that this should be a school of 300, or 100, or of 50 boys, but it *is* necessary that it should be a school of Christian gentlemen.'

But the school was far from occupying Arnold's whole energies. The *History of Rome* went on; he took part in all the great questions of the day, political and theological. In politics he was a Whig, without being fettered by the ties of party. In the theological discussions of the time, he was chiefly distinguished by the broad views he had adopted of the nature of a Christian church. As already intimated, it was his leading idea that a *Christian people* and a *Christian church* ought to be synonymous expressions. He would never tolerate that use of the word church which limited it to the clergy, or which implied in the clergy any peculiar sacredness, or any trace of mediatorial function. The *priest* was unknown to him in the Christian community; this placed him at once in antagonism to the High Church party; and even Low Churchmen complained that he did not set sufficient value on their sacred order. But all, of whatever party, admitted and admired the zeal with which he taught that the full spirit of Christianity should permeate the whole of our civil or political life. If he seemed to lower the altitude of the clergy, it was only because he would raise the general level of the laity. He was convinced that 'the founders of our present constitution in church and state did truly consider them to be identical, the Christian nation of England to be the church of England; the head of that nation to be, for that very reason, the head of the church.'

In domestic life Dr Arnold was most happy; here he was distinguished by unflinching cheerfulness and spirit. In 1832 he purchased Fox How, a small estate between Rydal and Ambleside; and in this charming retreat he enjoyed in the vacations, amongst the family circle, his own uninterrupted studies. In 1841 he received from Lord Melbourne the Regius Professorship of Modern History at Oxford—an appointment accepted with great delight. He delivered some introductory lectures, which were heard with enthusiastic interest; and it was his intention, on his retirement from Rugby, to enter with zeal upon the duties of his professorship. But this and all other literary enterprises were cut short by a sudden and most painful death. The journey to Fox How was to be taken in a few days, when he was seized with a fatal attack of *angina pectoris*. Few biographies end more abruptly or more mourn-

fully; but he met his death with perfect fortitude and Christian hope, on 12th June 1842. He is buried in Rugby Chapel. His principal works are six volumes of Sermons (best ed. 1848); an edition of Thucydides (3 vols. 1830-35); the *History of Rome* (3 vols. 1838-43), broken off by his death at the end of the second Punic war; and his Oxford historical Lecture (1842). 'These,' in the words of an *Edinburgh* reviewer, 'are all proofs of his ability and goodness. Yet the story of his life is worth them all.' And that story has been admirably told by Dean Stanley in his *Life and Correspondence of Arnold* (1845, 12th ed. with additions, 1881).

Arnold, THOMAS KERCHIEVER, a writer of educational works, was born at Stamford in 1800, and was educated at Trinity College, Cambridge, where he graduated in 1821. In 1830 he became rector of the small parish of Lyndon, in Rutlandshire, and there he died on the 9th March 1853. In 1838 he published his *Practical Introduction to Greek Prose Composition*, of which, in 1849, when it reached a seventh edition, more than 20,000 copies had been sold. Next year appeared his *Latin Composition*. The works are still largely used, and new editions of both appeared in 1881. He also published, with the Rev. J. E. Riddle, an *English-Latin Lexicon* (1847); edited twenty-five volumes of classics; and produced English, French, Italian, German, and Hebrew grammars. All these works show his obligation to continental, especially German, scholars. As a theologian, he published several volumes of sermons, and some controversial treatises.

Arnot, WILLIAM, a popular Scottish preacher and author, was born at Seone in 1806, studied at Glasgow, and became minister of a parish there in 1839. He left the Established Church at the Disruption in 1843, becoming a minister of a Free Church in Glasgow; in 1863 he went to Edinburgh, and there he died in 1875. He published *Laws from Heaven for Life on Earth*, *Illustrations of the Book of Proverbs*, *The Parables of our Lord*, and *The Church in the House*. His *Autobiography and Memoir*, edited by his daughter, appeared in 1877.

Arnot, NEIL, was born at Arbroath in 1788, the son of a Catholic farmer. From Aberdeen Grammar-school he proceeded to Marischal College; and after going through the medical course came up to London in 1806, and studied ten months at St George's Hospital. He made two voyages to China as surgeon in the service of the East India Company, then from 1811 till 1855 carried on a large practice in London. He was physician to the French and Spanish embassies, an original member of the senate of the London University (1836), a fellow of the Royal and Geological Societies, and Physician Extraordinary to the Queen (1837). He died in London, 22d March 1874. A course of lectures (1823-24) on natural philosophy in its applications to medicine formed the basis of his *Elements of Physics, or Natural Philosophy, General and Medical* (1827, 7th ed. 1876). In 1832 he invented the Water-bed (q.v.); and his treatise on *Warming and Ventilating* (1834) describes the 'Arnot Stove' and 'Arnot Ventilator' (see WARMING AND VENTILATION). His *Survey of Human Progress* (1861) is full of enlightened views on improvement generally. He was a munificent benefactor to the higher education, he and his widow giving no less than £12,000 to the London University, the four Scottish universities, and two ladies' colleges in London.

Arnotto. See ANNOTTO.

Arnsberg, a town of Westphalia, on the Ruhr, 36 miles E. of Hagen by rail. In the orchard below its ruined castle is still pointed out the spot where

the famous Vehmgerichte (q.v.) was held. Pop. (1885) 6131.

Arnstadt, the chief town in the principality of Schwarzburg-Sondershausen, picturesquely situated on the Gera, 10 miles S. of Erfurt. It is one of the oldest Thuringian cities, its existence being traceable as far back as 704 A.D. Formerly it was the chief emporium for trade between the fertile lowlands and the Thuringian forest region, but is now a manufacturing town, engaged in weaving, glove-making, brewing, &c. Pop. (1885) 11,537.

Arnsvalde, a Prussian town, 41 miles SE. of Stettin, between three lakes. Pop. (1885) 7378, largely iron-workers.

Arokszállás, a town of Hungary, 44 miles NE. of Pesth. Pop. (1880) 12,794.

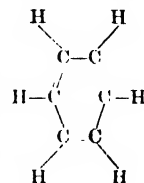
Arolsen, the capital of the principality of Waldeck, on the Aar, 14 miles SSW. of Warburg. Its castle (1720) contains a library with valuable MSS., Pompeian antiquities, and West's 'Death of Wolfe.' The sculptor Rauh and the painter Kaulbach were natives. Pop. (1885) 2442.

Aromatics constitute a class of medicines which owe their properties to the essential oils, to benzoic and cinnamic acids, to volatile products of distillation, or to odorous glandular secretions. The plants that contribute to this class of medicines are those which yield essences, camphor, or odorous resins, and amongst the families which yield the most important aromatics are the Labiate, Umbelliferae, Lauraceae, Myrtaceae, Anantiaceae, Coniferae, Scitamineae, Orchideae, &c. In some cases, the aromatic matter is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger and galanga; or the bark, in the case of cinnamon, canella, and cascarilla; or the flowers, as in the case of cloves; or the fruit, as in the case of nutmeg and vanilla; or the wood, as in the case of sandal wood and aloes-wood; or the leaves, as in the case of most of the Labiate, Umbelliferae, &c.

Aromatics may be arranged in the following subclasses: (1) Those in which the active principle is an essential oil, as the oil of thyme, lavender, eucalypt, neroli, fennel, &c. (2) Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. (3) Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, &c. These are tonics and vermifuges. (4) Those of which musk is the type, such as civet and ambergris; and certain plants with a musk-like odour, such as *Madra moscata*, *Mimulus moschatus*, and *Hibiscus abelmoschus*. (5) Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which possess stimulant properties. (6) Lastly, those which are artificially produced by destructive distillation, as tar, creosote, benzol, or the various empyreumatic oils.

As a general rule, these substances act as diffusible stimulants of more or less power, and as antispasmodics, while those in which a bitter principle is present act as vermifuges and tonics. The whole class were formerly regarded as possessing disinfectant and antiseptic properties, and there is no doubt that some, as coal-tar, creosote, &c. strongly possess this property. In this country we usually associate aromatics with other medicines; but in France aromatic infusion, lotions, baths, &c. are prescribed. The composition of aromatic infusion may be given as an illustration: Take equal parts of the leaves of sage, ordinary and lemon thyme, hyssop, origanum, wormwood, and mint; and infuse 50 parts of these leaves in 100 parts of boiling water.

Aromatic Series. This term is applied to a large group of organic chemical compounds, many of which occur in balsams, essential oils, and other substances having an aromatic odour. It was originally limited to the compounds of the benzoic group, but it has now been extended so as to include other series homologous with them, and ranging round the group of hydrocarbons, C_6H_6 . The simplest of these hydrocarbons is Benzene (q.v.), in which there are six atoms of carbon, the formula being C_6H_6 . Now, such a body is an unsaturated one (see ATOMIC THEORY), and is capable of uniting with monatomic elements such as chlorine to form chlorides, containing from one to six atoms of chlorine. To account for this, Kekulé has devised a structural formula for benzene, which assists one in understanding the complex relations of the aromatic series; but it must be borne in mind that such formulae do not profess to represent the actual positions of the atoms in the compound, but are only used as convenient stand-points from which to regard them. In Kekulé's formula, the double lines, uniting the atoms of carbon, indicate that each of these atoms can still unite with an atom of hydrogen. From this peculiar construction, it is evident that the compounds of the aromatic series must have distinctive properties, and the number of these compounds be very large. Thus, referring to chlorine, we see



that we may either *replace hydrogen by chlorine*, or add chlorine to benzene, the resulting bodies having the composition C_6H_5Cl and $C_6H_4Cl_2$, when the full amount of chlorine has been taken up. So also oxygen may enter into the compound, giving us a series of bodies called *phenols*, which are monatomic, diatomic, or tetratomic, according to the number of atoms introduced. The phenols correspond to the alcohols of the fatty series (see ALCOHOLS), ordinary phenol having the formula C_6H_5OH , that of common alcohol being C_2H_5OH . Hydrogen may also be replaced by amidogen, NH_2 , giving rise to *Amines* (see ALKALOIDS), the best known of which is Phenylamine, or Aniline (q.v.), $C_6H_5NH_2$. The *nitro compounds*, in which hydrogen is replaced by the group NO_2 , include nitrobenzene, or artificial oil of bitter almonds (not to be confounded with the true Oil, q.v.), the formula of which is $C_6H_5NO_2$.

When carbon enters the benzene group, C_6H_6 , it forms many new compounds. Thus hydrogen may be replaced by radicals such as methyl and ethyl, CH_3 and C_2H_5 , giving rise to such compounds as

Methyl benzene..... $C_6H_5CH_3$;
Ethyl benzene..... $C_6H_5C_2H_5$;

or, again, more than one molecule of these radicals may be introduced, as in

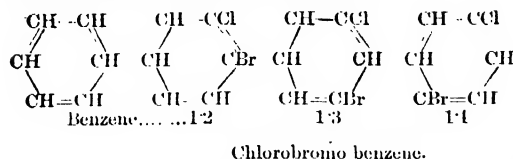
Dimethyl benzene..... $C_6H_4(CH_3)_2$;
Methyl-ethyl benzene..... $C_6H_4CH_3C_2H_5$.

From these again are derived aldehydes, alcohols, and acids, of which we can only give a single example:

Methyl benzene, or toluene..... $C_6H_5CH_3$;
Benzyl alcohol..... $C_6H_5CH_2OH$;
Benzyl aldehyde..... C_6H_5CHO ;
Benzoic acid..... C_6H_5COOH .

All of which, in their composition and properties, show close analogies to the corresponding fatty compounds. An account of the aromatic series would be incomplete without reference to the *isomerism* which exists among its members. A reference to the formula for benzene will show that when only one atom of chlorine has been

introduced into the molecule, there can only be one monochlor benzene. When two, however, are present, or when one atom of chlorine and one of bromine have replaced hydrogen, as in chlorobromo benzene, the case is different :



Chlorobromo benzene.

Here we see that the atoms of hydrogen replaced may be either contiguous (1·2), separated by one group of CH (1·3), or by two groups (1·4); and that this is not a mere distinction on paper is borne out by experiment, which has succeeded in producing three chlorobromo benzenes, differing in properties, but identical in percentage composition. There are many other isomeric bodies known, but for further information the reader must refer to the article on ISOMERISM, or to a practical treatise on the subject.

Aromatic Vinegar differs from ordinary vinegar (which is acetic acid diluted with water) in containing certain essential oils which impart an agreeable fragrance. It is generally prepared by adding the oils of cloves, lavender, rosemary, bergamot, neroli, and cinnamon to the strongest acetic acid. Aromatic vinegar is a very pleasant and powerful perfume; it is very volatile, and when snuffed up by the nostrils, is a powerful excitant, and hence is serviceable in fainting, languor, headache, and nervous debility. Aromatic vinegar is generally placed on a sponge in a smelling-bottle or in a *châlogette*; it can also be purchased as a liquid in phials; and a drop or two allowed to evaporate into a sick-room, overpowers, but does not destroy any unpleasant odour. The liquid must, however, be cautiously dealt with, as it is very corrosive.

Aronia. See CRATAEGUS.

Arroostook, a river which, rising in the north of Maine, falls into the St John in New Brunswick, after a course of about 120 miles. It possesses an historical interest from its connection with the long-agitated question of the north-east boundary between British America and the United States.

Arouet, the family name of Voltaire (q.v.).

Arpad, the national hero of Hungary, under whom the Magyars first gained a footing in that country, about 884. Chosen duke on his father's death, he extended his conquests by incessant and mostly successful warfare with the Bulgarians, Wallachians, and Moravians, and made more than one successful incursion into Italy. He died in 907, leaving his power to his son. The Arpad dynasty ruled Hungary as dukes from 889 to 1000, and as kings from that year until it became extinct in the male line with Andreas III. in 1301. Arpad yet lives in the popular songs of the country, and not a little legend has gathered round his name.

Arpeggio, in Music, a chord of which the notes are given, not simultaneously, but in succession. From any one chord, several forms of arpeggio may be produced. In modern music the arpeggio is usually indicated by a perpendicular waved line prefixed to the chord.

Arpent, an old French land measure, corresponding to the English acre. It contained a hundred square perches, and varied with the varying value of the perch from about an acre and a quarter to about five-sixths of an acre; or, in modern French measure, from one-third to one-half of a hectare.

Arpino (anc. *Arpinum*), the birthplace of Cicero and Marius, stands perched on an eminence, midway between Rome and Naples, about 65 miles from each. Pop. (1881) 5145.

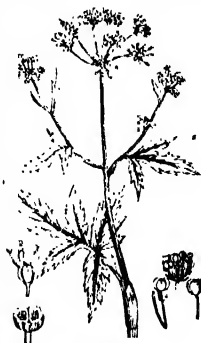
Arquà, an Italian village with about 1000 inhabitants, 12 miles SW. of Padua, in the heart of the Euganean Hills. Here Petrarch died July 18, 1374; his house may still be seen, and his monument of red marble in the churchyard.

Arquebus, or HARQUEBUS (from Dutch *haakbus*, lit. 'a gun with a hook'), was the first form of hand gun which could fairly be compared with the modern musket. Those of earlier date were fired by applying a match by hand to the touch-hole; but about the time of the battle of Morat, in 1476, guns were used having a contrivance suggested by the trigger of the arbalest or cross-bow, by which the burning match could be applied with more quickness and certainty. Such a gun was the arquebus. The arquebus being fired from the chest, with the butt in a right line with the barrel, it was difficult to bring the eye down low enough to take good aim; but the Germans soon introduced an improvement by giving a hooked form to the butt, which elevated the barrel; and the arquebus then obtained the name of the *haquebut*. Soldiers armed with these two kinds of weapon were designated *arquebusiers* and *haquebutiers* - the former were common in the English army in the time of Richard III., the latter in that of Henry VIII.



Arquebusier.

Arracacha (*Arracacha esculenta*), a plant of the natural order Umbelliferae, a native of the elevated tablelands in the northern parts of South America. It is much cultivated in its native country for its roots, which are used as an esculent. When boiled, they are firm and tender, with a flavour not so strong as that of a parsnip. The plant is very like hemlock, to which genus Humboldt indeed referred it, and has a similar heavy smell. The flowers are in compound umbels, and are of a dull purple colour. The arracacha was at one time very strongly recommended as a substitute for potatoes; it was introduced into Britain through the exertions of the Horticultural Society, and its cultivation perseveringly attempted; but it has been found unsuitable to the climate of Britain, and of other parts of Europe where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavourable to it. The climate of the south of Ireland resembles that of its native regions more than any other in the British Islands. It seems to require a very regular temperature and constant moisture. There are probably some parts of the British colonies in which the arracacha would be found a very valuable plant. In deep loose soils



Arracacha.

it yields a great produce. It is generally propagated, like skirret, by offshoots from the crown of the root. By rasping the root and washing, a starch, similar to arrowroot, is obtained.—There is another species of the same genus, *A. moschata*, a native of the same regions, the root of which is uneatable.

Arrack, or **RACK**, is an East Indian name (derived from the Arabic) for all sorts of distilled spirituous liquors, but chiefly to that procured from *toddy* or the fermented juice of the cocoa and other palms, as well as from rice and the kind of brown sugar called *jaggery*. The palms in other tropical countries furnish a fermented beverage similar to the toddy of India, and in a few instances also it is distilled, but arrack essentially belongs to India and the adjacent countries. The cocoa-nut palm (*Cocos nucifera*) is a chief source of toddy or palm-wine, which is obtained from trees ranging from twelve to sixteen years old, or in fact at the period when they begin to show the first indication of flowering. After the flowering shoot or spadix enveloped in its spathe is pretty well advanced, and the latter is about to open, the toddy-man climbs the tree and cuts off the tip of the flower shoot; he next ties a ligature round the stalk at the base of the spadix, and with a small edged he beats the flower-shoot and bruises it. This he does daily for a fortnight, and if the tree is in good condition, a considerable quantity of a saccharine juice flows from the cut apex of the flower-shoot, and is caught in a pot fixed conveniently for the purpose, and emptied every day. It flows freely for fifteen or sixteen days, and less freely day by day for another month or more; a slice has to be removed from the top of the shoot very frequently. The juice rapidly ferments, and in four days is usually sour: previous to that it is a favourite drink known in some parts of India as *calu*, and to the Europeans as *toddy*. When turning sour, it is distilled and converted into arrack. It is largely manufactured in Goa, Batavia, Ceylon, and Siam. A similar spirit is made pretty largely from the magnificent fan-leaved palm, *Borassus flabelliformis*, and also from the so-called date-sugar palm, *Arenga saccharifera*. The name is also given to a spirit obtained from rice and sugar fermented with cocoa-nut sap. An imitation arrack may be prepared by dissolving 10 grains of benzoic acid in a pint of rum.

Arrah, a town of Bengal, 320 miles NW. of Calcutta by rail. Here in 1857 a dozen Englishmen, with 50 Sikhs, held out for eight days against 3000 sepoys. A force despatched to their aid fell into an ambuscade, and lost 290 out of 415 men; but finally they were relieved by Major Eyre. Pop. (1881) 42,998.

Arraignment, in the practice of the criminal law in England, means calling a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. His innocence being presumed, it is the law, and is so laid down in the most ancient books, that, though charged upon an indictment of the gravest nature, he is entitled to stand at the bar in the form and in the garb of a free man, without irons or any manner of shackles or bonds, unless there be evident danger of his escape, or of violence at his hands. When arraigned on the charge of treason or felony, the prisoner may be called by a by name to hold up his hand, by which he is held to confess his identity with the person charged. This form, however, is not an essential part of the proceedings at the trial, and it is sufficient for the prisoner, when arraigned, to confess his identity by verbal admission or otherwise. When thus

duly arraigned, the indictment is distinctly read over to the accused in the English tongue, and he then either confesses the fact—that is, admits his guilt—or he puts himself upon his trial by a plea of 'Not guilty.' Formerly, an incident of the arraignment sometimes was the prisoner's *standing mute*, as it was called—that is, refraining from, or refusing, a direct answer to the indictment; in which case the court proceeded to inquire whether the silence was of malice on the part of the prisoner, or was produced by the visitation of God, and to deal with him accordingly (see *PEINE FORTTE ET DURE*). But by the 7 and 8 Geo. IV. chap. 28, sect. 2, it is enacted that where a prisoner shall stand mute of malice, it shall be lawful for the court to order the proper officers to enter a plea of 'Not guilty,' on which the trial shall proceed, as if the plea had been actually pleaded by the prisoner himself. Where, however, there is room for doubt as to the sanity of the prisoner standing mute, a jury consisting of any twelve persons who may happen to be present is forthwith charged to inquire whether he has intellect enough to plead and to understand the course of the proceedings. If they find the affirmative, the plea of 'Not guilty' is entered, and the trial goes on; but if the negative, the insane person is ordered by the court to be kept in strict custody during Her Majesty's pleasure, according to the 39 and 40 Geo. III. chap. 94, sect. 2.

In the Scotch criminal law, the expression *Calling the Diet* corresponds to arraignment. The prisoner is called upon by name by the presiding judge to attend to the indictment against him, which is read aloud by the clerk, and the prisoner is then required to plead, as in England, either 'Guilty' or 'Not guilty.' If 'Not guilty,' the trial proceeds, the prisoner, either by himself or his counsel, having always the last word.

The term arraignment is derived from the French *accuser*, the ancient form of which, according to Littré, is *accusier*. See TRIAL, INDICTMENT, INFORMATION, PROSECUTION, PLEA, VERDICT, NOT PROVEN.

Arran, an island of Buteshire, in the mouth of the Firth of Clyde, $5\frac{1}{2}$ miles SW. of Bute, 10 W. of Ayrshire, and 3 E. of Kintyre, from which it is separated by Kilbrannan Sound. It is of an oval form, 19 miles long and $10\frac{1}{2}$ broad, with an area of 168 sq. m., about a seventh part being cultivated. Pop. (1821) 6541; (1881) 4730. The general aspect of Arran is mountainous and heathy, and in the north the jagged peaks are singularly grand. All around the coast is the low platform of an ancient sea-margin, with lofty cliffs on the S. and SW., from which the country rises abruptly. The highest point is Goatfell (a corruption of the Gaelic *Gaoth Bheinn*, 'wind mountain'), which, rising to a height of 2866 feet, forms a prominent feature of the island. From its sides slope the romantic glens of Rosie and Sannox, and at its base to the SE. opens Brodick Bay, at the head of which lay, until lately, Brodick village. The houses which composed it have now been removed, and a new village has sprung up on the opposite side of the bay, called Invereloy, where there is a spacious hotel. To the south of this, round a bluff headland, is Lamlash Bay, the chief harbour of Arran, and the best on the Firth of Clyde, sheltered by Holy Island, once the seat of a monastery. A picturesque mass of columnar basalt, 1030 feet high, succeeds. Farther south lies Whiting Bay, near which are two cascades 100 and 50 feet high respectively. At the SE. point of Arran is Kildonan Castle, opposite which is the small isle of Pladda, crowned by a lighthouse. Large caverns occur in the cliffs of the S. and SW. coast. In one of these, the 'King's Cave,' in the basaltic promontory of

Drumadoon, Robert the Bruce hid himself for some time. Shiskan Vale, opening into Drumadoon Bay, is the most fertile part of Arran. Loch Ranza, a bay in the north end of Arran, runs a mile inland, and is a herring-fishing rendezvous. Arran is a favourite resort for summer quarters; there is daily communication with it by means of steamboats from Ardrossan and the Clyde, the ports touched at being Brodick, Lamlash, and Corrie. The geology of Arran is almost unique, and displays a greater succession of strata than any other part of the British Isles of equal extent. The SE. half consists of Devonian sandstone, extending from the east coast 4 or 5 miles inland, and running SW. from Brodick beyond the centre of the island; and of trap rocks and carboniferous strata, which occupy the middle and western portions. The NW. half consists of a central granite nucleus, including Goatfell, bordered on the west by a tract of mica-slate, and on the north, east, and south by Lower Silurian rocks, which, again, have a run of Devonian sandstone on the east and south. Lias and oolite lie on the mica-slate. There are only rivulets in Arran; one of them tumbles over a precipice 300 feet high. Some level parts in the south half of Arran are fertile. The chief crops are oats and potatoes. Cattle, sheep, fish, and oats are exported. With the exception of the Kirk-michael estate of 3632 acres, the whole island belongs to the Duke of Hamilton, whose seat is Brodick Castle. Many antiquities occur, such as cairns, standing stones, and stone circles. Several stone collins were found in a cairn 200 feet in circumference. Loch Ranza Castle, now in ruins, was once a residence of the Scots kings. From Brodick Bay, Bruce sailed to Carrick on his expedition for the recovery of the crown. See D. Landsborough's *Arran* (2d ed. 1875), and J. Bryce's *Geology of Arran* (4th ed. 1875).

Arranging, a term in Music which means the adapting of a piece of music so as to be performed on an instrument or instruments different from those for which it was originally composed, as when orchestral or vocal compositions are set for the pianoforte, or the reverse. It corresponds with the work of translation in literature, and requires similar gifts. The pianoforte arrangements of Franz Liszt have excelled all others, although in some cases he may have overstepped the boundary of propriety. Many of the classical masters, especially Bach, Beethoven, and Mendelssohn, have themselves performed the task of arranging their own music. See ACCOMPANIMENT, POTPOURRI, and FANTASIA.

Arras, the capital of the French department of Pas-de-Calais, on the navigable Scarpe, 120 miles N. of Paris. A fortress of the first rank, it consists of an old town on an eminence, and a new town in the plain. Among the principal edifices are the cathedral (1755-1833) and the beautiful Gothic hôtel-de-ville (1510), whose belfry, 246 feet high, was rebuilt in 1835. There are manufactures of lace, hosiery, beet sugar, and agricultural implements, and a brisk trade in corn and oil. It was long so famous for its tapestry that in England the name *carpets* was given to tapestry hangings. Arras was the capital of the Celtic Atrebatæ (whence the name), and subsequently of the province of Artois. As such it was long a part of Burgundy. It was ceded to France in 1482, but came to Austria in 1493; nor did it finally become French till 1640, when Louis XIII. took it after a long siege. Robespierre was a native. Pop. (1872) 21,417; (1881) 27,041.

Arrest. To arrest an offender or a debtor is to seize his person in order that he may be brought to trial, or compelled to obey the law. In English

criminal practice, arrest may take place in two ways: (1) *Without Warrant*. According to Mr Justice Stephen, any person may arrest any one who commits a felony or gives a dangerous wound in his presence, any one whom he reasonably suspects of felony (if a felony has in fact been committed), or any one whom he finds committing certain offences specially provided for by statute. A peace-officer may also arrest any one who commits a breach of the peace in his presence, or any one whom he reasonably suspects of felony (whether a felony has been committed or not). His statutory powers of arrest are also wider than those of private persons; he may, for example, arrest any person whom he finds loitering at night, whom he has reason to suspect of having committed or being about to commit a crime; and (in the Metropolitan district) any person loitering at night who cannot give a satisfactory account of himself. (2) *With Warrant*. A warrant is an order addressed by a judge or magistrate to a peace-officer, or to the officers within a certain district. If the person against whom it is issued is not within the jurisdiction of the authority issuing it, the warrant must be 'backed' by a magistrate of the place where such person is, or is supposed to be. Warrants issued in one part of the United Kingdom may be backed by a magistrate in another part. By an act of 1881, provision has been made for backing warrants throughout Her Majesty's dominions. The act applies to treason, piracy, and every offence which, by the law of that part of the empire where it was committed, is punishable by twelve months' imprisonment with hard labour. For the arrest of offenders against foreign law, or of offenders against British law taking refuge in a foreign country, see EXTRADITION.

In executing a warrant, or in making a lawful arrest, an officer, or even a private person, may break open doors in pursuit of the person whom he is authorised to take. Obstruction of an officer making an arrest has always been treated as a serious offence: it seems that a person may still be charged with treason if he rescues a prisoner charged with treason. Modern legislation treats this offence as a misdemeanour, for which imprisonment with hard labour is the appropriate punishment. But to rescue a murderer or a prisoner is punishable by penal servitude. The same subject is treated in Scotch law under the head *Deference*, which Sir Archibald Alison, in his *Work on the Criminal Law of Scotland* (vol. i. p. 491), says, 'consists in the resistance to the officers of justice in the execution of their duty.' It is essential to such deference that it should be such as to defeat the warrant or other process which authorises the arrest. Mere unsuccessful attempts with this view are charged under the name of 'resisting and obstructing the officers of the law in the execution of their duty.'

On the other hand, persons who are active in assisting the officers of the law may be compensated for their expense and trouble, as provided by an act of 1851, which amends and extends the provision contained in an act of 1827. A special allowance may be made to any person who has shown extraordinary courage, diligence, or exertion.

In English civil procedure, arrest takes place only in exceptional cases. All the superior courts have power to arrest or attach persons for contempt. By an order of the court or a judge (which is not made without notice to the party), a writ may be issued to the sheriff, commanding him to arrest a certain person, and have him before the court to answer his contempt. Defendants on civil process were formerly arrested by means of the writ of *ca sa* or *capias ad satisfaciendum*. But this writ is now rarely issued, unless in the cases expressly

excepted out of the Debtors Act, 1869. That act put an end to imprisonment for debt, except where non-payment of money due involved contempt of or disobedience to the order of a competent court, as, for example, where a trustee refuses to comply with the order of a court of equity. Orders of committal are now made for the most part by judges of county-courts, to compel payment of a debt by instalments, where the debtor is drawing weekly wages, or has other means of paying the instalments, but has no furniture or other goods on which execution can be levied.

Arrest may also be made to prevent a debtor from absconding, or from removing his property out of the jurisdiction. Ancient writs available for this purpose were those of *capias ad respondendum* and *ne erant regno*; the modern practice is regulated by the Debtors Act, 1869, and the Bankruptcy Act, 1883, sect. 25. Arrest on mesne process (i.e. during the progress of a suit, and before judgment given) is now abolished, except as above explained.

The following are privileged from arrest on civil process: Ambassadors and diplomatic representatives of foreign courts; peers of the United Kingdom; Scotch and Irish peers; members of parliament; clergymen during divine service, or going to or returning from service; and all persons attending any court of justice, as parties, witnesses, solicitors, or counsel. Barristers are probably entitled to their privilege only when attending the superior courts; Archbold, in his *Practice of the Common Law*, refers to a case where a barrister was discharged who was arrested on circuit. Persons in attendance on the sovereign are privileged; writs of protection were formerly issued to persons in the royal service, but this prerogative is now seldom or never exercised. In regard to privilege of parliament, it may be observed that though members of both Houses are free from arrest on civil process, actions may be brought against them; and the 10 Geo. III. chap. 50 provides that such actions are not to be delayed on pretence of privilege. It is also provided by the Bankruptcy Act, 1883, that if a person having privilege of parliament becomes bankrupt, he may be dealt with as if he had no privilege. No person who is a bankrupt may sit in either House; and if a member of the House of Commons fails to satisfy his creditors within a year after he is adjudicated a bankrupt, his seat becomes vacant. Privilege does not exempt any person from arrest for contempt of court.

In the Scots law, the word arrest is not a technical term for process against the person. But see ARRESTMENT and ARRESTMENT FOR FOUNDING JURISDICTION; also ATTACHMENT.

Arrestment, in the Scots law, is the legal process or diligence, as it is called, by means of which a debtor is prohibited from making payment or delivery to his creditor until another debt or claim due to the person making use of the arrestment by such creditor is secured or paid. Thus, if A owes £100 to B, but B, again, is indebted to C, arrestment may be used by C in the hands of A; the effect of which is to prevent A paying to B until C's claim has been satisfied. A, the party in whose hands the arrestment is laid, is called the arrestee; C, the user of the arrestment, is called the arrester; and B, the arrester's debtor, is called the common debtor. The arrestment, however, has not the effect of transferring the debt or subject arrested. For that purpose, a particular form of action, called an *action of furthcoming*, is necessary, decree in which operates as a complete transfer to the arrester. Arrestment in security is also used on the dependence of an action, so as to secure the debt which the pursuer expects to establish by decree. Arrestments are frequently recalled by

the court as oppressive, especially where a limited security is given. Arrestment in the hands of a man's banker is practically tying up his means. The corresponding diligence against land is called Adjudication for Debt, or, if in security, Inhibition. The corresponding English term is Attachment of Debts (q.v.).

ARRESTMENT FOR FOUNDING JURISDICTION is a procedure in Scots law, by which a foreigner, or other debtor abroad, who is not subject to the jurisdiction of the Scottish courts, but who has movable property in Scotland, may be made subject to the jurisdiction of the Court of Session. By the Sheriff Courts Act, 1877, foreigners may be sued in the sheriff courts also, if a ship, in which the foreigner is interested, has been arrested within the sheriffdom. In the ordinary case, what is attached is money due to the foreigner, and any sum, however small, and any movable, if of appreciable value, is sufficient. The procedure is therefore one liable to great abuse; it should not be extended beyond the convenience of trade, on which the custom was originally based in the Netherlands. In practice it has been extended to all claims of a pecuniary nature, but not to actions relative to *status*. The practice must be treated as an exception to the general rule that a pursuer should go to the court of his debtor's residence. The only equivalent in England is the custom of foreign attachment in the city of London. Heritable property in Scotland is a distinct ground of jurisdiction against foreigners without special procedure.

ARRESTMENT OF WAGES, so far as required for the aliment of the artisan or servant, has always been prohibited by the common law of Scotland. Such arrestment is considered to be injurious to the working-classes, because it encourages transactions upon credit. This idea was supported by the result of a government inquiry, originating in Glasgow in 1853. By statute in 1845, such arrestments were prohibited absolutely in small-debt actions. The limit of what is required for aliment in the case of artisans and farm-servants and labourers, was fixed by statute in 1870 at 20s. per week, the excess being arrestable. This rule, however, does not apply to claims for rates and taxes, or for the support of a child.

ARREST OF JUDGMENT is the name of a motion made after verdict in the criminal courts of England, for acquittal on the ground that there is a blunder in the indictment. There was formerly a similar application in the common law courts, but this is now by appeal from the order of the judge to enter the verdict. See JUDGMENT.

Arrhenaetherum, a genus of grasses. See GRASSES.

Arrian, FLAVIUS, a native of Nicomedia, in Bithynia, born about 100 A.D. A disciple and friend of Epictetus, the Stoic philosopher, he was admitted to the citizenship in Athens, and in 124 A.D. to that of Rome at the hands of the Emperor Hadrian. He was appointed prefect of Cappadocia in the year 136, and under Antoninus Pius, the successor of Hadrian, he was promoted to the consulship. But some four years afterwards, he appears to have retired from public life, and devoted himself to literature in his native place, where he died at an advanced age in the reign of Aurelius. As the pupil and friend of Epictetus, he edited the *Manual of Ethics* (*Enchiridion*) left by his master, and wrote the lectures of Epictetus (*Diatriba*) in eight books, of which only four have been preserved. The most important work by Arrian is the *Anabasis Alexandrou*, or history of the campaigns of Alexander the Great, which has come down to us almost entire. This book is our chief authority on the

subject of which it treats, and is a work of great value. Arrian had chosen Xenophon as his model of composition, and hence the Athenians called him the young Xenophon. In close connection with his former history, Arrian wrote his *Indian History*, giving an account of the people of India. Other writings by Arrian, his letter to Hadrian on a voyage round the coasts of the Euxine Sea, and another, a voyage round the coasts of the Red Sea, are valuable with regard to ancient geography. The best edition of Arrian's *Anabasis* is that by Krüger (1848); Eng. trans. by Chinnock (1884).

Arrondissement (Fr. from *arrondir*, 'to make round'), an administrative district forming a subdivision of a French Department (q.v.).

Arrow. See ARCHERY.

Arrow-grass. The popular name of *Tirglochin*, a genus of Alismaceæ, of which two species occur in Britain.

Arrowhead (*Sagittaria*), a genus of petaloid monocotyledons of the order Alismaceæ, distinguished by unisexual flowers, having three herbaceous sepals and three coloured petals, with numerous stamens and carpels, the latter separate. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world. — The Common Arrowhead (*S. sagittifolia*) is a beautiful aquatic, a native of England, with arrow-shaped leaves which rise above the surface of the



Arrowhead (*Sagittaria sagittifolia*).

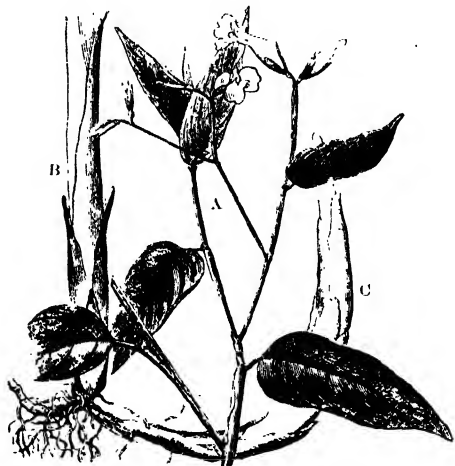
water. It is one of those plants which have enjoyed an undeserved reputation as cures for hydrophobia. The starchy corns have sometimes been used for food, but have an acrid unpleasant taste. *S. sinensis* has long been cultivated in China and Japan; and *S. obtusifolia* (N. America) is also used as food. Several species and many varieties of this genus are found in North American waters.

Arrow-headed Characters. See CUNEIFORM.

Arrow-heads. See ELF-BOLTS and FLINT IMPLEMENTS.

Arrowroot is a variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine starchy farina, much valued as a delicacy, and as an easily digestible food for children and invalids. It is obtained from the root-stocks (*rhizomes*) of different species of *Maranta*, belonging to the natural order of Scitamineæ. The species chiefly yielding it is *M. arundinacea*, a native of tropical America, cultivated in the West India Islands, and growing about 2 feet high, with ovate-lanceolate somewhat hairy leaves, clusters of small flowers on two-flowered stalks, and globular fruit about the size of currants. The rhizomes are often more than a foot long, of

the thickness of a finger, jointed, and almost white, covered with large papery scales. They are dug up when a year old, washed, carefully peeled, and reduced to a milky pulp. In Jamaica the roots are reduced by beating in deep wooden mortars; in Bermuda, by means of a wheel-rasp; but modern machinery has now been introduced. The pulp is



Arrowroot (*Maranta arundinacea*);

A, flowering branch; B, base of flower stem; C, branch of the rhizome. (From Benth's and Trimen's *Medicinal Plants*.)

then mixed with much water, cleared of fibres by means of a sieve of coarse cloth or hair, and the starch is allowed to settle to the bottom. The water dissolves, and so removes the greater part of the albumen and salts, the starch quickly settling down as an insoluble powder, which is then purified by successive washings. The arrowroot is finally dried in the sun or in drying-houses, from which dust and insects are excluded by means of gauze. The careful peeling of the roots is of great importance, as the skin contains a resinous matter which would impart a disagreeable flavour. Great precautions are taken against impurities; and the knives used in peeling the roots, and the shovels used in lifting the arrowroot, are made of German silver. The West Indian arrowroot most esteemed in the market is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian arrowroot is not in general so highly valued, perhaps because substitutes for the genuine arrowroot more frequently receive that name. The *Maranta arundinacea* is now, however, cultivated to some extent both in the East Indies and in Africa. *M. indica* is to be regarded as a mere variety, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica, and other species and varieties are sometimes cultivated. What is called Florida arrowroot is in part prepared from *Zamia integrifolia*; but the genuine *Maranta* arrowroot is also produced in Florida.

The amount of starch present in the rhizomes varies, according to age, from 8 to 26 per cent.

Arrowroot is exported in tin cases, barrels, or boxes, carefully closed up. It is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly fallen snow is being made into a snowball. Through the microscope the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry starch is quite inodorous, but when dissolved in boiling water, it has a slight peculiar smell, and swells up into a very perfect

jelly. Potato-starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration, many of the particles of which have a truncated extremity, and their surface is irregular or tuberculated. Arrowroot is also sometimes adulterated with rice-starch, and with the common starch of wheat-flour.

Tapioca (see MANIOC) was formerly sometimes called Brazilian arrowroot; and the starch prepared from many other plants has often also usurped the name. Thus 'Chinese arrowroot' is said to be from the tubers of *Nelumbium speciosum*. East Indian arrowroot is often prepared from different species of *Curema* (see TURMERIC), while *Dion edule*, Zannia, and other cyceads are used in Mexico, *Tacca oceanica* in the Sandwich Islands, and so on; even the starch of maize sometimes appearing as Oswego arrowroot, that of Arum as Portland arrowroot, and that of potato as 'English arrowroot.' Although materially differing in rate of digestibility, arrowroot proper having in this respect the advantage, all these varieties of starchy food have much the same nutritive value, and all alike require the addition of milk to form an adequate food. It should further be borne in mind that all starches alike are indigestible to infants, whose salivary ferment is undeveloped.

The name arrowroot had its origin from the use of the fresh roots as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been accordingly recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles.

Arrowsmith. AARON, born at Winston, Durham, in 1750, at the age of twenty came up to London, and by 1790 had established a great map-making business, his chief productions being maps of the World, North America, Scotland, and Southern India. He died 23d April 1823. His nephew, JOHN (1790-1873), was also an eminent cartographer.

Arroyo Molinos, a village in Estremadura, Spain, noted as the scene of the complete discomfiture of the French forces under General Girard by Lord Hill on the 28th October 1811, who took 1500 prisoners, the whole artillery, colours, baggage, &c., with a trilling loss to himself. French historians (Thiers and others) maintain that the battle was 'undecided.'

Arru Islands, a group of over eighty islands in the Dutch East Indies, lying west of New Guinea, with a united area of about 2650 sq. m., and a population of some 15,000. The largest island is Tanna-Besar (77 miles long by 50 broad). The surface is low, and the coasts are steep and inaccessible, on the east side fringed with coral reefs. The soil is covered with the most luxuriant vegetation. The islands are remarkably rich in animal life, especially birds, mostly related to those of New Guinea. The inhabitants resemble the Melanesians of New Guinea more than the natives of the Moluccas. On the ground of this inclination to the Papuan type, in connection with the peculiar formation of the Archipelago, Wallace has advanced the supposition that the Arru Islands formed originally a part of New Guinea. There is an active trade, but not in native hands. Cotton and woollen goods, iron and copper wares, Chinese pottery, knives, rice, opium, and arrack are imported, and bartered for mother-of-pearl, trepang, edible nests, pearls, tortoise-shell, and the skins of birds of paradise.

Arsacidae, a dynasty of Parthian kings, so called from the name of its founder, Arsaces, who wrested a kingdom for himself from the feeble

grasp of the Seleucid Antiochus II. about 250 B.C. Its greatest kings were Mithridates, Phraates, Mithridates 'the great,' Volagases I., and Artabanus, who lost his crown and his life at Hormizdjan, in 227 A.D., in his attempt to stem the conquering career of Ardashir, founder of the Sassanian dynasty. See ARMENIA, and PARTHIA.

Arsamas, a Russian town, 60 miles S. of Nijni-Novgorod. It has thirty-four churches, three monasteries, important leather manufactures, and considerable trade in sail-cloth and sheep-skins. Pop. (1881) 11,497.

Arsenal (through Ital. and Span. forms from Arab. *dār al-ḥiṣnā*, 'workshop,' made up of *dār*, 'house,' *al*, 'the,' *ḥiṣnā*, 'art.') The Span. *alacazana* best preserves the wider sense of the Arabic original; the other languages have narrowed its meaning to 'dock' or 'armoury'), a term formerly applied merely to a repository of naval stores and ordnance, but now extended to the foundries and factories of warlike stores, for both army and navy, as well as to the depôts where they are stored. The principal arsenals of Great Britain, in their true sense as naval stores and dockyards, are at Deptford, Chatham, Pembroke, Sheerness, Portsmouth, and Plymouth. The only government foundry for shell and heavy guns in Great Britain is at Woolwich (q.v.). There is a manufactory of small-arms at Enfield, and abroad, arsenals at Gibraltar, Malta, and Calcutta, with a gun-factory at Cossipore.

In France, the principal naval arsenals are at Cherbourg, Brest, Toulon, L'Orient, Rochefort, Dunkirk, Havre, St Servan, Nantes, Bordeaux, and Bayonne, with military arsenals at Paris; in Russia, at St Petersburg, Cronstadt, and Sebastopol; in Prussia, at Danzig; in Denmark, at Copenhagen; in Turkey, at Constantinople; in Italy, at Genoa, Livorno, Spezia, Civita Vecchia, Naples, Ancona, and Venice; in Austria, at Trieste; in Spain, at Cadiz, Carthagena, and Barcelona; in Portugal, at Lisbon. The principal armouries of the United States are at Springfield, Massachusetts, where small-arms are manufactured, and at Watertown, in the same state, where heavy guns are cast; besides which there are numerous other arsenals and depôts of supply in various states and territories. There are naval arsenals at New York, Boston, Baltimore, and other points on the coast.

Arsenic and its Compounds. Arsenic (through Lat. from Gr. *arsenikon*, 'arsenic,' a word meaning literally 'male,' *arsen*, from the notion of the old alchemists that metals were of different sexes) is the name applied in popular language to a well-known poisonous substance, arsenious acid, but, strictly speaking, the term is restricted to the metal, of which the symbol is As, and the atomic weight 75. The metal arsenic is rarely found free in nature, but in a state of combination it occurs largely. The most important of all arsenical minerals, because of their use as ores of arsenic, for the preparation of white arsenic, or arsenious acid, are those in which arsenic is combined with nickel and cobalt. The chief of these are arsenical pyrites, or leucopyrite, nickeline, cobaltine, and smaltine, which are found in Cornwall and the continent of Europe, as well as in other parts of the world. The last-named two are used for the preparation of blue colours for porcelain or stoneware. The presence of arsenic in a mineral may commonly be detected by the alliaceous odour which it emits before the blowpipe.

The metal is generally prepared from arsenious acid, As_2O_3 , by mixing it with its own weight of charcoal, placing the mixture in a well-covered crucible, and subjecting the whole to heat, when

the metal set free by the charcoal rises, and condenses in the upper part or cover of the crucible. Metallic arsenic is very brittle, can easily be reduced to powder by hammering, or even pounding in a mortar; and when a freshly cut surface is examined, it presents a brilliant dark steel-gray lustre, which, however, readily tarnishes on exposure to the air. The metal, as such, is not considered poisonous, but when introduced into the animal system, it is there faintly acted upon by the juices, and in part dissolved, at the same time, exhibiting poisonous properties. When heated in the open air, it burns with a peculiar bluish flame, and emits a characteristic alliaceous odour. The only use to which the metal arsenic is applied in the arts is in the manufacture of leaden shot of the various sizes, when its presence in small quantity in the lead renders the latter much more brittle than it ordinarily is. Of all the compounds of arsenic the most important is the one already alluded to—namely, arsenious acid, which is an oxide of arsenic. With sulphur, arsenic forms two important compounds: *Realgar*, As_2S_2 , a red, transparent, and brittle substance, which is employed in the manufacture of the signal-light called *White Indian Fire*; and *Orpiment*, As_2S_3 , or *King's Yellow*, a cheap pigment of a yellow colour. With hydrogen, arsenic forms arseniuretted hydrogen, AsH_3 , a very poisonous gas, and one which has been fatal to several chemists.

ARSENIOUS ACID is the arsenical compound most familiarly known. It is obtained principally during the roasting of the arsenical nickel ores in Germany in furnaces communicating with flues. When the arsenic of the ore burns, it passes into the condition of arsenious acid, As_2O_3 , and rising as vapour into the somewhat cool flue, is there deposited as a grayish powder, known by the names of *Smelting-house Smoke*, *Flowers of Arsenic*, *Poison-flour*, or *Rough Arsenious Acid*. In this condition, the arsenious acid is contaminated with some impurities, from which it may be separated by introducing the gray powder into an egg-shaped vessel, and applying heat at the lower end, when the arsenious acid rises in vapour, and condenses in the cool end as a transparent glassy or vitreous substance. Ordinary arsenious acid of the shops (which is what is popularly known as *arsenic*) is a white crystalline powder, which feels decidedly gritty, like fine sand, when placed between the teeth, and has no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in about 10 parts of boiling water, or 100 parts of cold water. As ordinarily sold in quantities under 10 lb. in weight, the arsenious acid is required by law to be coloured with $\frac{1}{2}$ of its weight of indigo, or $\frac{1}{4}$ of its weight of soot; the object of the admixture being to render any liquid to which the arsenious acid might be added, with a murderous intent, of a black or bluish-black hue, and thus indicate the presence of something unusual. In packages of 10 lb. and upwards, arsenious acid is allowed to be sold in the pure white crystalline form without coloration. When placed in a spoon, or other vessel, and heated, the arsenious acid volatilises, and condenses in crystals on any cool vessel held above. Again, when arsenious acid is placed on a red-hot cinder, the strong alliaceous odour characteristic of arsenic is given off. When thrown upon water, instead of at once descending through the water like sand, arsenious acid, notwithstanding its great density (specific gravity 3.70), partially floats on the surface, as wheat-flour does; and that portion which sinks in the water rolls itself into little round pellets, which are wetted only on the outside, and contain much dry arsenious acid

within. The solution of arsenious acid in water is recognised by three tests:

(1) Hydrosulphuric acid and hydrochloric acid produce a *yellow precipitate* of sulphide of arsenic, As_2S_3 , soluble in ammonia.

(2) Ammonio-sulphate of copper, an *apple-green precipitate* of arsenite of copper, CuHAsO_3 .

(3) Ammonio-nitrate of silver, a *yellow precipitate* of arsenite of silver, As_3AsO_3 .

In many cases, arsenious acid is used as a means of destroying animal life, but, happily, the processes for the detection of the poison in organic mixtures and in the animal tissues are unerring and trustworthy.

For the isolation and recognition of arsenious acid in organic mixtures, such as the contents of a stomach, the method generally pursued is called *Reinsch's process*, from the name of its discoverer. The manner of its application is to treat the organic mixture with water sufficient to render it thin, then add hydrochloric acid to the extent of one-eighth of the volume of the liquid; apply heat, and when the whole has been raised to near the boiling-point, introduce clean, newly burnished pieces of copper in the form of wire, gauze, or foil. If arsenious acid be present in the mixture, a steel-gray coating of metallic arsenic will form on the surface of the copper. This apparent tarnishing of the copper may take place when no arsenious acid is in the mixture, and may be produced by salts of mercury, antimony, &c., as well as by sulphur compounds, and even occasionally by fatty matters. To distinguish between the coating formed by arsenious acid and that produced by other substances, the copper is taken out of the mixture, washed with water, to remove acid; immersed in ether, to dissolve off any adherent fatty matter; dried between folds of blotting-paper; introduced into the lower end of a dry glass test-tube, and there cautiously heated. The metallic arsenic, As, is driven off by the heat from the surface of the copper, rises in vapour into the upper portions of the test-tube; there meets the oxygen of the air, with which it combines, forming arsenious acid, As_2O_3 , and thereafter deposits itself on the inner surface of the cool part of the tube in little glistening crystals. On allowing the tube to cool, adding water thereto, and applying heat, the water dissolves the crystals of arsenious acid, yielding a solution, to separate portions of which the liquid tests mentioned above may be successfully applied.

Arsenious acid forms compounds (salts) with alkalis and other bases, which are called arsenites. Some of these are employed in commerce and medicine. Arsenious acid, boiled with a solution of potash, or carbonate of potash, forms an arsenite of potash, used in medicine, and known as *Fowler's Solution* or *liquor arsenicalis*. Many sheep-dipping mixtures are composed of arsenious acid, soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. A compound of arsenious acid and the oxide of copper, called the arsenite of copper, or *Scheele's Green*, is a pigment largely used by painters as a pretty and cheap green paint. The same substance is, or was formerly, extensively employed in the manufacture of common green paper-hangings for the walls of rooms; and it seems certain that rooms covered with paper coated with this green arsenite of copper are detrimental to the health of human beings residing therein, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. Another green pigment is named *Schweinfurth Green*, and contains arsenious acid, oxide of copper,

and acetic acid, and is a double arsenite and acetate of copper.

Arsenic has long been used as a medicine. When taken into the stomach, it is soon absorbed into the blood, acting powerfully in such skin diseases as Psoriasis, Lepra, Eczema (q.v.), &c. As a tonic alterative it holds a high place, and it is much used in ague, remittent fever, and St Vitus's dance. The usual method of administering arsenic is in small doses (from three to five drops) of the liquor arsenicalis, largely diluted with water, twice or thrice in the day.

When given in the doses above mentioned, for eight or ten days, symptoms of poisoning begin to appear, the skin becoming hot, the pulse quick, the eyelids hot and itchy; the tongue has a silvery appearance; the throat is dry and sore, the gums swollen and tender; and if the treatment is persisted in, salivation ensues, and then come nausea, vomiting, diarrhoea, nervous depression, and faintness. The quantity necessary to destroy life, of course, varies, but under circumstances favourable for its operation the fatal dose for an adult is from *two to three grains*. Death from a poisonous dose of arsenic may occur in a few hours, or after the lapse of days. Arsenic has been used frequently as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. Fortunately, in most cases its detection is easy.

In some countries, especially in Austria (though the practice is not unknown in England), arsenic is given to cattle and horses to render the skin bright and glossy. In Styria, arsenic is taken by the peasant girls to increase their personal attractions; and it has been definitely ascertained that over a considerable area in the south-west of Austria, including Styria, Carinthia, Salzburg, Tyrol, Lower Austria, and the Erzgebirge, arsenic eating is largely practised by men, who nevertheless attain a healthy old age. Arsenic eaters, who generally begin the use of the drug secretly, say that it improves the complexion, increases the digestive powers, and so strengthens the respiratory organs as to enable the bearers of heavy burdens to climb mountains with ease. At first a dose may be taken once a week, afterwards daily; and there are authenticated cases of men who consume six grains enough to poison three men at one dose without inconvenience. Once the habit is established, it is impossible to give up arsenic eating. Terrible heart-gnawings following any attempt gradually to stop the practice; and sudden cessation causes death. That arsenic can be taken habitually for any length of time with impunity was formerly regarded as a physiological impossibility; and yet the fact is established on unquestionable evidence.

No effective chemical *antidote* for arsenic has yet been discovered. In case of an overdose, or of intentional poisoning, the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, chalk and water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron; bleed freely; take a tepid bath, and use narcotics. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

Arsinœ, daughter of Ptolemy I., king of Egypt, born 316 B.C., married at sixteen the aged Lysimachus, king of Thrace, whose eldest son, Agathocles, had already wedded Lysandra, her half-sister. Desirous of securing the throne for her own children, Arsinoë prevailed on her husband to put Agathocles to death; whereupon Lysandra fled with her children to Seleucus in Asia, and induced

him to declare war against her unnatural father-in-law. Lysimachus was slain, and Seleucus seized the kingdom. Arsinoë now sought refuge in Macedonia, which, however, was also taken possession of by Seleucus; but on his assassination, a few months later, by Ptolemy Ceraunus, her half-brother, she received a hypocritical offer of marriage from the usurper, who wanted to destroy her two sons lest they should prove formidable rivals to his ambition. She consented to the union, and opened the gates of the town in which she had taken refuge, but her children were butchered before her eyes. She then fled to Egypt, where, in 279, she married her own brother, Ptolemy II. Philadelphus. There was a city of Arsinoë in Middle Egypt, formerly called Crocodilopolis; another near the head of what is now the Gulf of Suez; and three of the same name in Cyprus.

Arsis and Thesis (Gr., 'raising up,' and 'laying down'), grammatical terms applied to the elevation and depression of the voice in speaking. In music, they signify the strong position and the weak in a bar, and are indicated by the down-beat and up-beat of the hand.

Arson (Old Fr. from Lat. *ardere*, 'to burn'), in the criminal law of England, is a felony, described as the malicious and wilful burning of the house or building of another man. It is essential to the offence that the house or building burned should be that of *another*; to destroy one's own house by fire, especially in a town, or where other buildings are contiguous, which are thereby put in danger, is only a misdemeanor. Mere negligence will not support a charge of arson—there must be criminal intention. The matter is dealt with by the Criminal Law Consolidation Act of 1861, and various penalties of penal servitude and imprisonment are imposed. The statutory offence includes the setting fire to a house in the possession of the offender, if it be done with intent to defraud, and also the setting fire to growing woods and farm produce (the most frequent form of this offence), and to any goods in a house which it would be a felony to set fire to. The statute also includes the case of using explosives against a house, and renders all attempts at arson offences punishable by penal servitude or imprisonment. By special statutes for the protection of the public service, setting fire to ships of war, arsenals, government stores, &c., or the attempt to do so, is punishable by death.

In Scotland, the technical term is *wilful fire-raising*. This is properly confined to setting fire to buildings, growing or stored corn, growing wood, or coal-heughs; but the common law extends to many minor offences, such as burning sheds, haystacks, and furniture. A man is of course entitled to burn his own property; but one of the most common offences is burning property with intent to defraud insurers. The tendency of the Scots law is to exact a wider criminal responsibility than in England for negligence in fire-raising, and for the indirect results of the offender's act. The statutory punishment of wilful fire-raising in Scotland is still death, but penal servitude is the punishment actually inflicted.

Ars-sur-Moselle, a town of Alsace-Lorraine, on the river Moselle, 6 miles SW. of Metz by rail. Pop. (1885) 4620, largely iron-workers.

Art. A man in the savage state is one whose whole time is of necessity occupied in getting and retaining the things barely needed to keep him alive. When a society is able to supply its needs without using up, to that end, all the time of all its members, leisure arises, and some or all of them are enabled to devote part or even the whole of their time to occupations other than the support

and protection of life. All such occupations have pleasure for their aim, and are included in the domain of art in its widest sense. The earliest forms of art were naturally methods of decoration applied to objects of daily use. Prehistoric man is known to have developed several kinds of decoration. Innumerable decorated objects of every kind have been dug up, the like of which are often actually found in use among little developed races in our own day. Every work of art, says Mr Ruskin, 'either states a true thing, or adorns a serviceable one.' The earliest existing 'statement of truth' in the form of art is probably to be found amongst the engraved bones which the cave-dwellers have left behind them. Some of these bones have first been formed into convenient shape for handles and the like, and afterwards roughly sculptured into the likeness of an animal's head. Others have been used as so much paper to draw upon, without any visible intention of applying them afterwards to purposes of utility. Beasts of the chase formed the subjects which these prehistoric artists scratched with the point of a flint upon the bones. One engraved outline of a mammoth has been found, and many of stags knee-deep in the long grass. Not impossibly this early study of animal life was connected with those rudimentary beliefs which, in the form of fetishism, seem to have been universal in all the least-developed peoples. Animal life, again, is the subject of the best work of Egyptian and Chaldean artists.

In ordinary speech the intonation of the voice already provides the materials for song. Passionate speech approximates to song still more closely. Musical notes can be gained from shaped pieces of wood, stone, and other simple contrivances. Thus rude forms of music could and doubtless did arise very early, generally in connection with the dance or with some kind of mimetic performance out of which the drama was in time destined to arise.

Civilisation seems to have first arisen in three great river-basins—those of the Nile, the Tigris and Euphrates, and the Yang-tse-kiang. About early Chinese art we as yet know next to nothing. Chaldaea does not come within the range of history till very much later than Egypt; nevertheless, the civilisations of the two countries probably arose independently, and at about the same time. In Egypt, animal worship always retained its hold upon the people down to the latest times, but it was coupled with ancestor-worship. The art of Egypt arose chiefly out of the latter part of the religion. The preservation of the body or the likeness of the dead was essential in the estimation of every Egyptian. Hence arose mummification; hence also portrait sculpture for burial, and monumental sculpture for display. It was likewise essential to preserve the aspect of the ordinary occupations of life, because, by the intervention of Osiris, such representations were believed to be made real for the souls of the dead. Hence the number of incidents of everyday life depicted on the walls of Egyptian tombs, often with great skill, especially in the rendering of animal forms, the traditions of the treatment of which may have descended from a remote antiquity. The monumental architecture of Egypt was likewise encouraged by the same desire for permanence. In its earliest known forms (the pyramids, mastabas, &c.), it was essentially an architecture of the tomb. The quantity of the harder rocks readily available, helped to determine the nature of Egyptian art. Chaldaea is a stoneless country. Its arts chiefly depended upon the nature of clay for their forms. The Chaldeans (proto-Babylonians) wrote upon clay tablets, which were afterwards baked. They built with bricks, chiefly sun-dried. They invented the potter's wheel at an early date, and

they found out how to enamel. Their chief buildings were covered with enamelled bricks. They imported stone, which they sculptured well (the statues from Tello in the Louvre), treating it as a precious thing. They were great magicians, believers in the power of many spirits capable of being represented by natural objects—a belief at first not far removed from fetishism. They therefore studied the motions of the heavenly bodies; and their temples were solid staged towers of sun-dried brick, raised above the mists of the plains. They invented the forms of winged men and animals to represent certain demons and spirits; the figures of angels also come to us from Chaldaea. The dome and the proto-Ionic capital were Chaldean inventions. The Assyrians borrowed their arts and sciences from the Chaldeans, but they infused their own fierce spirit into the more subtle ideals of their neighbours. The Hittites, whose empire in Asia Minor and Syria was probably contemporary with the rise of Assyrian power, would owe their culture to Assyria. The Phoenicians, whose power in the Levant culminated later, borrowed their arts partly from Egypt, partly from Assyria. Their trading ships traversed all parts of the Mediterranean. An artistic people themselves, they yet produced a most important effect in the development of art, for it was by their commerce that the artistic and other products of different countries were exchanged. The Greeks were thus brought in contact with works of art made by the Egyptians and the peoples of the East. Assyrian traditions likewise reached them overland through Asia Minor. The influences of Egypt and Assyria are clearly perceptible in early Greek works and legends. Greek art developed very slowly at first. It was only under the influence of the passionate struggle of Greece against the Persian hosts, that the Hellenic ideal took perfect form. It may be called an Ideal of Reserve. In architecture and sculpture alike this ideal reigns, culminating in the age of Pericles. Gods are represented in perfect human shape, without exaggeration of form or posture, and with little expression beyond an aspect of benevolent calm and satisfaction. After the Peloponnesian war, the purity of this ideal passed away. Sculpture tended to become theatrical or portrait-like, and portraiture became the leading art. In Italy there was little native art, except that which the Etruscans cultivated, and of which they seem to have derived the origins from the Phoenicians. The only known remnants of it are objects found in tombs. The Greek influence was next powerfully felt, especially in those parts which were colonised by Greek settlements. After the conquest of Greece by Rome, the Hellenic influence in art became supreme. Roman artists, in the time of the empire, developed in architecture a style founded upon that of the Greeks, with certain oriental elements added. The dome and the semi-dome were very much employed by Roman architects. Fresco and mosaic were likewise much used. Portrait sculpture flourished. When the capital of the empire was removed to Byzantium, oriental influences became stronger, and Greek traditions gradually lost predominance. The ancient traditions still lingered on in Italy, but new influences from Byzantium changed the ideals there also.

The adoption of Christianity had not at first much effect upon the style of art. Roman influences had for a long time pervaded all Western Europe. When the barbarian invasions commenced, and the western empire fell, art was for a time completely paralysed. Ireland alone was practically untouched. Celtic art seems to have been a local product, influenced at some early date by Byzantine-Greek traditions brought over

perhaps by early missionaries. As order slowly emerged out of the chaos that followed the fall of the Roman empire, local styles of art began to arise here and there. In these, Roman and barbarian traditions were mingled. Irish missionaries laid the foundation of Anglo-Saxon art, and carried the Celtic style to various parts of Europe. The influences of Byzantium and of the old traditions still lingering in parts of Italy, were likewise felt from time to time. Under the Merovingian kings, local revivals of art were effected. Charles the Great made the first really successful attempt at an organised revival, in which he was assisted by workmen trained at Byzantium. A promising revival likewise took place in Italy under the Lombards. Every revival in the north of Europe was, however, nipped by a return of warfare and disorder.

It was not till after the year 1000 A.D. that the tendencies towards a permanent revival became fixed. Then arose in North Germany and along the Rhine the Romanesque style. Many fine churches built in this style in the 11th and 12th centuries are still in existence. Under the direction of Bishop Bernard, the school of Hildesheim reached great excellence. Fine churches were built, excellent metal-work done, manuscripts beautifully illuminated, and wall-paintings executed in a very noble style. The Romanesque style owed little to Byzantium, but much to Italy. The crusades, by bringing East and West in contact, helped to quicken the new life. The ancient art of Chaldaea, handed over to the Persians, modified by Egyptian and Greek influences, altered in its ideals by the rise of Mohammedanism, had waxed in power, and become in the hands of the Saracens thoroughly different in style and aims from the arts of Europe. Its chief centres were Bagdad, Cairo, and Spain. Sicily very early experienced the influence of this school. Its decorative principles spreading throughout Western Europe in conjunction with Byzantine influences, created the great style of Gothic art (which had nothing to do with the Goths). Gothic art was especially cultivated in the feudal countries. It was different in France from what it was in England, but in both countries it reached its perfection in the first half of the 13th century, and then gradually declined. When Gothic art was culminating in the north of Europe, Italy was in a backward condition. Some fine buildings were raised, but the amount of artistic production was small.

The religious revival brought about by Francis of Assisi in the 13th century rapidly changed this state of things, and an intellectual revival followed. Fresco-painting improved under the hands of Cimabue, Giotto, and their followers at the end of the 13th and the beginning of the 14th centuries, who worked chiefly for Franciscan patrons. The Dominican revival soon succeeded, and then, in the 15th century, fine schools of art of all kinds flourished in various parts of Italy. The revival of classical study gave a new impetus to art. Ancient sculptures and buildings were studied and imitated, and about the commencement of the 16th century the culmination of this epoch of art was reached. Meantime, in the north of Europe, in the 15th century, painting had been cultivated with great success, whilst Gothic traditions were everywhere losing power. Under the influence of the mystic preachers, a beautiful school of painting arose in the Rhine Valley in the 14th century. Meister Wilheim and Meister Stephan of Cologne being its leading artists. At the beginning of the 15th century, the centre of art-life in the North shifted to the Low Countries. There the Van Eycks made technical improvements in the method of painting, besides introducing the study of nature as

the chief aim of their art. The Flemish school influenced all Germany, and generated the schools of Nuremberg, Augsburg, and other towns. When the classical revival spread north of the Alps, Gothic art ceased, and the so-called Renaissance reigned everywhere.

The Reformation came, and for a time ruined the arts (with the exception of music) which had grown up in the service of the medieval church. In some parts of Europe, the old traditions lingered on longer than elsewhere. Portraiture survived longer than other forms of art, and indeed culminated in excellence when ideal painting was already on the decline. The life of the 16th century was a life of action, and the art of action (*drama*) was naturally the one most cultivated. Painting, then, was succeeded by drama, the age of Raphael by that of Shakespeare. A school of painting, however, flourished in the Low Countries when the art was practically dead everywhere else. Under the protection of drama, music also developed until that art in turn reached the highest level. Meantime the art of painting had also revived, and schools of a new character arose in different countries. These schools have developed in different directions, and felt the influence of the contemporary literary and scientific movements which have gone on about them. The Romantists of Germany and the Pre-Raphaelites of England have been thus produced. It will be for future generations to estimate the value of these and similar modern schools.

In the preceding historical sketch, the arts of the East have been but slightly referred to. The Chinese school probably arose spontaneously, and may afterwards have been affected by Chaldaean influences conveyed through Persia, and thence overland. The Japanese school is merely an offshoot of the Chinese. Median and Persian intermediaries likewise conveyed to India some dim traditions of the arts of the Semitic and Greek peoples. Under the influence of the Buddhist movement a national Indian art was created, and some of its finest monuments are to be found in the interior of Ceylon. Chaldaean traditions have been the foundation of all the arts of Western Asia.

The English style of painting was practically founded by Van Dyck, in the reign of Charles I. He was succeeded by Sir Peter Lely, and he in turn by Sir Godfrey Kneller. Richardson, Hudson, and other mediocre painters followed, the mass of their work consisting of portraits. In the 18th century, a revival was effected by Hogarth, Reynolds, and Gainsborough. Wilson painted landscapes in the classical style; Gainsborough introduced into the rendering of landscape a broader rendering of country scenes. Turner's art was primarily founded upon the classical style, but he united with that a direct appeal to nature, and by unbounded study he attained a skill of handling and a minute knowledge of nature in every mood, such as has never before or since been attained. Constable carried on the traditions of Gainsborough, and strongly influenced the landscape painters of France. The decline of landscape art in the present day is marked by increasing triviality on the one hand, and slovenliness on the other.

The impulse to decorate a useful object is one common to all mankind. It is merely to continue a little further the labour of simple manufacture. With this instinct is involved the equally natural impulse which drives men to imitate the objects seen about them, and by which they are chiefly interested. Landscape-painting, for example, is suggested by the desire to fix upon some portable surface the image of a view which pleases or

interests the draughtsman. But out of this effort at imitation arises a new desire—that of creation. The artist is not satisfied merely with attempting to copy what he sees. The study of nature fills his mind with thoughts of beauty; he conceives persons and scenes which he has never beheld, and the impulse arises in him to give visible form to such conceptions. Works produced in this spirit are new creations, and take rank as the highest form of art. Their excellence is determined by a twofold test. Is the thought itself fine? has it been duly expressed? In the works of early schools of art, we often meet with the finest thoughts expressed by very undeveloped means, and yet completely. In works of a declining school, the expressive power of the artists is generally great, but their thought feeble or mean. Complete powers of expression, themselves beautiful, and fullness of lovely and ennobling thought, are the marks of a culminating school. Every school of art arises in the wake of some new ideal which it endeavours to express. Some ideals are best expressed in monumental buildings, like the ideal of Persistence of the Egyptians. The Greek ideal of Reserve found its clearest expression in perfect sculpture. Each ideal exercises a formative power, and directs at once the desires and the hands of men. It wins for itself, step by step, clearer and nobler expression, and enjoys a brief time of perfect life. Then a decadence sets in, and after a longer or shorter period of transition or barrenness, another ideal arises to produce a new art. Such a transition can best be watched taking place in the 14th century, between the mediæval ideal, which produced chivalry, feudalism, and Gothic architecture, and the Renaissance ideal, which produced the study of antiquity, the revival of learning, a tendency towards despotism in government, and the great schools of painting in Germany and Italy. It follows from this, that in every epoch there is one dominant art to which the rest are subsidiary. In the 13th century, architecture ruled. Painting and all the minor arts derived their forms from those developed in the service of architecture. The very binding of books was decorated with bas-reliefs. Ivory carvings were like little buildings.

It is impossible to draw a sharp line of division between fine and decorative art. Sculpture primarily intended to decorate a building, may be (as in the case of Notre Dame at Paris) amongst the finest, considered as pure sculpture. In a time of artistic culmination, almost everything that is made is endowed with something of the splendour of the supreme art. Nevertheless, one law can be stated to which all art, primarily decorative, must conform. Decoration must not interfere with the utility of the object decorated, but must rather express, or at all events be conformable (in spirit as in shape) to that utility. Giving to this same principle a wider application, we may deduce from it the law, applicable to all art whatsoever, that the material in which a work of art is executed must to some extent govern the style of the work. There is one style suitable for sculpture in granite, another for sculpture in marble, another for metal, another for wood. A figure roughly carved in the one substance would be wrong if copied into another. Again, the process of working has also to be taken into consideration in the design. A cartoon for a painting would not be suitable for translation into a stained-glass window, a tapestry, or a mosaic. Hence all mosaics copied from pictures are fundamentally wrong as works of art. In line-engraving, the lines are ploughed into a copperplate by the direct application of the strength of the engraver's arm. In etching, the copperplate is first covered with varnish, and then the varnish is scratched off in fine lines by the point

of a needle. The lines are afterwards bitten in by the chemical action of an acid. The artist's hand acts in the one case deliberately and with force, in the other swiftly and lightly. What, therefore, is suitable treatment in line-engraving is unsuitable in etching, and *vice versa*. In pen-and-ink drawing, the pen lays black lines on a white surface. In wood-engraving, the white spaces are cut out, and what is to print black is left standing in relief. A good pen-and-ink drawing, therefore, will make a bad woodcut.

All the decorative and many of the creative arts may likewise be considered as 'glorified handicrafts.' As long as an object is only intended for use, it is not a work of art. An object made purely for use may indeed be beautiful. If, like a ship or a water-wheel, it is made to be as it were used by the forces of nature, its forms are then as much dictated by the action of the forces of nature as the forms of a cloud or a hill, and it shares the beauty of all natural objects; but it is not a work of art. It is only when the workman goes beyond what is necessary for use, and consciously aims at giving also pleasure by his work, that he becomes an artist. Weaving is not an art, but tapestry-making is; it is the glorified handicraft of weaving.

Much has been written about the artistic or inartistic nature of certain peoples. Thus the ancient Greeks are considered an artistic race, the Romans inartistic. In all probability there is an artistic potentiality in every people. The ideal of the Greeks was representable, and their circumstances were at the time favourable to its representation. The Romans were chiefly employed in the government and administration of a large empire. Their ideal was not representable, and their energies were fully occupied in developing it in other than artistic directions. It is not the natural gifts so much as the condition and circumstances of a people at a given date that determine whether it shall be artistic or not. The French in the 13th century were the most artistic people in Europe. In the 15th century, the French produced relatively little of supreme excellence, whilst the Italians had in the meantime gone to the front. Art is primarily an expression of happiness, and a product of passion in leisure. When the passions of a race are fully occupied in the business of life, art languishes. It grows strong when a strong race is enabled by circumstances to devote its strength to joy. The passion of life in the present day is chiefly enlisted in scientific discovery. Art, therefore, is not the first thing in the life of any existing nation, and no supremely great school is at present culminating.

The bibliography of art is vast; but for the history of ancient art the reader may consult the works of Chipiez and Perrot; Feagusson's *History of Architecture*; Murray's *Greek Sculpture* (1880); Lord Lindsay's *Christian Art* (1847); Woltmann and Woermann's *History of Painting* (trans. by Colvin, 1880); Lübke's *History of Art*; Jameson's *Sacred and Legendary Art*; the South Kensington *Universal Catalogue of Works of Art*; W. M. Conway's *Early Flemish Artists*, and Ruskin's works. And see the articles *ÆSTHETICS*, *ARCHITECTURE*, *DRAMA*, *ENGRAVING*, *MUSIC*, *PAINTING*, *RENAISSANCE*, *ROMANTICISM*, *SCULPTURE*.

ART INSTRUCTION.—In the education of the artist, the first aim is to secure the power of outlining correctly in pencil from a copy, and after this has been attained, the pupil proceeds to add light and shade to his previous work in outline. The next step is to draw—or, if a sculptor is being trained, to model in clay—from the object itself, and for this purpose plaster casts of fruit, flowers, and leafage, and afterwards casts of statues, form the most convenient models. When sufficient power has been gained by these exercises, the pupil enters

the life-school, and works from the draped and the undraped human figure; if a sculptor, modelling the subject in clay; if a painter, rendering it in light and shade, and afterwards in colour. On leaving the life-class he is free to choose his own special department of art, but for the landscape-painter, and even for the decorative designer, as for the sculptor and the figure-painter, the fittest preparation and the most searching training lies in study from the human figure, though the latter require a knowledge of anatomy which is unnecessary in the case of the former. The training of the painter includes instruction in the various technical processes of oil and water-colour painting, as that of the sculptor includes instruction in the qualities and capabilities of the marble and other materials with which he works; while the architect requires a wider scientific knowledge, and a full acquaintance with the laws of mechanical construction.

In the early times of art the painter or sculptor was trained like any other craftsman. He entered the studio of some recognised practitioner of the art to which he meant to devote himself; and began, if under a painter, to prepare colours and to ground canvases, learning all that his master had to teach him; and finally he took part in the production of the monumental frescoes and even of the easel-pictures which were given to the public under the master's name. Gradually, however, the fine arts began to separate themselves more sharply from the other crafts. Their professors assumed a higher status than formerly. It became more and more the custom that an artist should finish with his own hand every portion of each work which issued from his studio. Academies of art were formed, and, in connection with them, art training was conducted by certified instructors. Thus a class of art-teachers, as distinct from artists, arose, a change not altogether favourable in its influence upon the future of art.

In England, one of the first efforts in the direction of systematic art training was made by Sir Geoffrey Kneller, who in 1711 founded an institution for giving professional instruction in design. In 1724 Sir James Thornhill established a similar academy in his own residence; but several students seceded from his class, headed by John Vanderbank, who started a short-lived academy, in which study from the life was introduced. This was followed by the well-known St Martin's Lane Academy, founded by William Shipley, where for thirty years those who afterwards became the leading artists of the time received their training. It was superseded by the schools instituted by the Royal Academy after its foundation in 1768.

The establishment of the South Kensington Department of Science and Art marks an important epoch in the history of art instruction in England. It may be said to have arisen out of the report of a select committee of the House of Commons appointed in 1835 'to inquire into the best means of extending a knowledge of the arts and principles of design among the people (especially the manufacturing population) of the country.' On the recommendation of this committee a sum of £1500 was devoted to the establishment of a Normal School of Design, with a museum and lectures. The school was opened in 1837, and by 1851-52 the government grant for this school and its various branches throughout the country had attained the amount of £15,055. In 1852 in accordance with a report of a select committee, the scheme was reconstructed, and a 'Department of Practical Art' created, with Sir Henry Cole, K.C.B., as superintendent; and a Science Department was added in 1853. It was under the management of the Board of Trade till 1856, when it passed under the control of the Lord President and the Vice-

president of Council on Education. In 1886 the number of schools and branch schools under the Science and Art Department throughout Great Britain was 226, in which a total of 40,134 students were being trained. The South Kensington Museum, founded in 1851, has played an important part in the art education of the country.

In 1869 a great stimulus to art education was given by the foundation, through the bequest of £45,000 by Felix Slade, of the 'Slade Art Professorships' in the universities of Oxford, Cambridge, and London. These chairs have been held by Mr Ruskin and other persons of the highest eminence, and it is impossible to overestimate the good which may be expected to result from this effort to improve the taste and knowledge of the wealthier classes, in whose hands the patronage and direction of art in our country mainly rests.

In Scotland, a remarkable effort in the direction of art instruction was made by Robert Foulis, the well-known printer. In 1751 he visited the Continent, engaged drawing-masters, and purchased pictures, casts, and engravings; and on his return to Glasgow in 1753 he started a school of art. The classes were continued till about 1776, and were far from a pecuniary success; but they afforded training to such excellent artists as David Allan and James Tassie, and exercised a most important and beneficial influence upon Scottish art. In 1760 the Board of Manufactures in Scotland founded a school of art in Edinburgh which is still in active operation, and which, under the name of 'The Trustees' Academy,' has afforded instruction to almost every Scottish painter of distinction for more than a century and a quarter. In 1858 this school was affiliated with the South Kensington Science and Art Department, and it serves not only for the instruction of art-craftsmen in design, but also as a school for painters and sculptors preparatory to the life-class of the Royal Scottish Academy. In 1880 art instruction was brought within the scope of the Scottish university curriculum by the establishment of the Watson-Gordon chair of Fine Art in the University of Edinburgh, in memory of Sir John Watson-Gordon, P.R.S.A., through the bequest of a sum of about £12,000 by his brother and sister.

In Ireland there are classes in connection with the Royal Hibernian Academy for study from the antique and the life; and the Dublin Metropolitan School of Art is under the South Kensington Department.

Various continental schools, especially those of Munich and Antwerp, have attained celebrity; but Paris is now the great centre of art instruction, in which many British and American students have been trained. Since the time of J. L. David—who, when in exile, also influenced the school of Belgium—the French have been celebrated for their command over form; and, in recent years, their power as colourists has greatly increased. The Parisian method of study is admirably adapted for giving its pupils a certain technical dexterity. The *Prix de Rome* of the French Academy is a much-coveted distinction, insuring a residence for study in the Villa Medici, Rome.

ART UTENSILS are the subject of a separate article; see page 460.

Arta (Turkish *Narda*, the ancient *Ambracia*), capital of a division of Thessaly, ceded to Greece by Turkey in 1881 (area, 395 sq. m.; pop. 31,178). The town stands on the left bank of the river Arta (the ancient *Aracthus*), 8 miles from its mouth in the Gulf of Arta (the ancient *Ambracian Gulf*), an arm of the Ionian Sea between Greece and Albania. It is the see of a Greek archbishop, and has a considerable trade. Pop. (1881) 4328, two-thirds Greeks.

Artabaz'us, the name of several distinguished Persians under the dynasty of the Achaemenidae. When Xerxes advanced against Greece, an Artabazus led the Parthians and Chorasmians. At a later period he warned Mardonius, but in vain, against engaging in battle at Plataea; and on his defeat fled with 40,000 men, and reached Asia in safety.—Another Artabazus was general under the Persian king, Artaxerxes II., and afterwards revolted against Artaxerxes III. For this offence he was forgiven, through the exertions of his brother-in-law, Mentor, a favourite and staunch supporter of the next king, Darius, whom we subsequently find Artabazus faithfully attending after the battle of Arbela. Alexander rewarded his fidelity by appointing him satrap of Bactria.

Artanthe. See MATICO.

Artaxerxes (ancient Persian *Artakshathra*), the name of several Persian kings. (1) ARTAXERXES I., surnamed *Longimanus* ('long-handed'), no doubt from his wide-reaching power), the second son of Xerxes, after the conspiracy of Artabanus, which caused the death of the king, put to death his elder brother, and ascended the throne in 465 B.C. His long reign, extending for forty years, was marked by a decline of power. (2) ARTAXERXES II., surnamed *Mnemon* ('the mindful'), succeeded his father, Darius II., in 404 B.C. After the death of his rebellious brother Cyrus in the battle at Cunaxa, he became involved in war with Sparta, which ended with the peace of Antalcidas. He died in 358.—(3) ARTAXERXES III., named *Ochus*, was the son and successor of the preceding. He found the empire falling to pieces, but did much to build it up again, and stave off the coming ruin. After putting down the revolts of Artabazus and Orontes, he subdued Phenicia and Egypt, and reduced Cyprus. He mainly owed the conquest of Egypt to his general, Mentor, and him he rewarded with the satrapy of the west coast of Asia Minor. He outraged the religion of the Egyptians by desecrating their temples and slaughtering their sacred animals. He was poisoned in 338 by his favourite eunuch, Bagoas.—(4) ARTAXERXES, or Ardeshir, the founder of the new Persian dynasty of the Sassanidae, overthrew Artabanus (Artabazus), the last of the Parthian kings, and was hailed as 'king of kings' on the battlefield in 227 A.D. He next conquered Media and a large part of the Iranian highlands, but had less success in Armenia, and was defeated by Alexander Severus in a great battle in 233. He made most of the former vassal states of the Arsacidae into provinces of an empire, which he consolidated so well that it endured for four hundred years. He died in 242.

Artedi. PETER, a celebrated Swedish naturalist, was born in 1705. He studied for the church at Upsala, but soon betook himself to the natural sciences, having Linnaeus for fellow-student and friend. He became specially distinguished in ichthyology; and having gone to England in 1734, he there completed his great work, the *Ichthyologia*, the first which gave a truly scientific character to the study of fishes. He was also a distinguished botanist. He went to Leyden in 1735, and in the same year was drowned in a canal near Amsterdam.

Artemis. a goddess of Greek Mythology, daughter of Zeus and Leto, twin-sister of Apollo, born with him in Delos, whence she is often called *Orthgia* from the ancient name of the island, or *Cynthia* from Mount Cynthus there. To the Greeks she was (1) a kind of feminine Apollo, armed like him with the bow, dealing plagues and death to beasts and men, but also healing diseases and averting evils. She has a special care over the

young of animals, and is therefore the goddess of the flocks and the chase. Her heart has never yielded to love. She slew Orion for an attempted insult, and changed Actaeon into a stag simply because he had seen her bathing. As the sister of Apollo, regarded as identical with Helios ('the sun'), she came to be regarded as the goddess of the moon, corresponding to Selene, and latterly the worship of the two was amalgamated. (2) The Arcadian Artemis is merely a goddess of the nymphs, hunting together with them on the Arcadian mountains, drawn in a car by four stags with golden antlers. (3) In Attica and Sparta the goddess was worshipped under a somewhat sterner aspect, and the usages point back to original human sacrifices. According to tradition, Iphigenia, who had herself been about to be sacrificed to the goddess, brought her image from Tauris and set it up at Brauron in Attica, whence *Brauronia* became a name of Artemis. At Sparta boys were scourged at her altar until it was sprinkled with their blood. (4) The goddess worshipped as Artemis at Ephesus was originally a divinity of Asiatic origin, quite distinct from the maiden huntress of native Greek mythology. Instead, she personified the fructifying powers of nature, and her image was represented as many-breasted (*polymastus*), the attendants of her temple being eunuchs and women. The allusion to her worship as 'Diana of the Ephesians' in Acts xix. will be remembered.

By the Romans Artemis was identified with the ancient Italian divinity Diana, a goddess of light, representing the moon, corresponding to Dianus or Janus, a god of light, the sun. The attributes proper to Artemis were attached to her name.

In art Artemis is represented as a young and handsome huntress, her hair tied up around her head, modestly clothed in the chlamys, but with the legs bare below the knees. She carries the bow and quiver of arrows, and is attended by dogs or stags. As the moon-goddess, again, she is clothed in a long robe, her head covered by a veil, above her brow the crescent of the moon. Her most famous statue is the so-called 'Diana of Versailles,' found in Hadrian's villa near Tivoli, now in the Louvre. See Claus, *De Diane antiquissima apud Graecos natura* (Breslau, 1881); and Schreiber's 'Artemis' in Roscher's *Lexikon der Mythologie* (Leip. 1884).

Artemisia, queen of Caria from 352 to 350 B.C., was the sister and wife of Mausolus, and is celebrated for the magnificent mausoleum which she caused to be erected to her husband's memory (see MAUSOLEUM). Another Artemisia, queen of Halicarnassus, accompanied Xerxes, with five ships, in his expedition against Greece, and distinguished herself at the battle of Salamis (480 B.C.); she ended her life, in consequence of an unfortunate attachment, by leaping from a rock.

Artemisia. See WORMWOOD.

Artemus Ward. See BROWNE, C. F.

Arteries (Gr. *artēria*, probably from *air-ein*, 'to raise,' but by some connected with *aēr*, 'air,' from the old idea that these tubes were air-carriers, since after death they are generally found empty), the vessels through which the blood passes from the heart to the tissues. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats of the artery: an external, consisting of interlacing bundles of fibrous tissue mixed with elastic fibres, which in large vessels such as the aorta are gathered together to form an elastic layer; a middle, which is muscular, contractile, and brittle, the fibres being arranged in a circular

direction; an internal, also brittle, the free surface being smooth and formed of a single layer of endothelial cells. External to these cells there is a layer of delicate connective tissue, outside which there is the elastic layer constituting the bulk of the inner coat, and distinguished by numerous perforations, causing its fenestrated appearance. The tube is also enveloped in cellular tissue, termed the *sheath* of the artery. When an

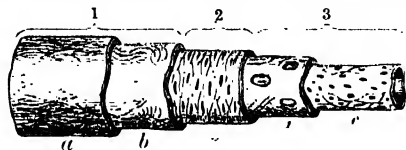


Diagram of the structure of an Artery (after Turner):

- | | | |
|------------------|---|-----------------|
| 1. External coat | { | a, fibrous. |
| | | b, elastic. |
| 2. Middle coat | { | c, muscular. |
| | | d, elastic. |
| 3. Internal coat | { | e, endothelial. |

artery is wounded by a sharp instrument, the effect varies with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse, the edges gape; and a nearly circular orifice allows of a profuse hemorrhage. If the artery be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to prevent fatal bleeding. The cut orifice contracts, and also retracts into its cellular sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel; and together, they stem the flow, till the cut edges of the artery have time to throw out lymph (see ADHESION), and heal as wounds of other tissues. When an artery is compressed by a ligature, the brittle inner and middle coats crack and curl inwards. The interior of the vessel becomes filled with a clot which extends as far as the nearest collateral branch. Gradually the clot is absorbed and fibrous tissue deposited in its place, the result being that this part of the artery is entirely obliterated. See BLEEDING.

The arteries of the human body consist of two groups—those belonging to the lesser or pulmonary circulation, and those belonging to the greater or systemic circulation. All the offshoots of the latter group are branches, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the artery of *supply*; and another, which passes almost branchless to supply the parts beyond—the artery of *transmission*. These, however, anastomose freely (see ANASTOMOSIS), so that the distant tissues are not solely dependent for their supply on only one arterial trunk. Thus the femoral artery divides in the groin into the *profunda* or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into the *external* carotid, to supply the neck and head, and the *internal* carotid, to supply the brain. Although arteries have generally the same distribution or arrangement of branches, they frequently vary, and thereby are apt to puzzle a superficial anatomist. Some of the varieties are so common that it becomes difficult to decide which is normal. These peculiarities are often found as constant forms among lower animals, but in many cases they may be due simply to enlargement or diminution of vessels already existing. The principal arteries will be considered under their distinctive names, as at

Aorta (q.v.); and see CIRCULATION, BLOOD, HEART, VEIN.

DISEASES OF ARTERIES.—Arteries, like other organs of the body, are liable to acute inflammation (Arteritis); but this rarely occurs except as a consequence of inflammation in the neighbourhood of the vessel, or of obstruction of its tube (see below). By far the most common and important disease affecting arteries is Atheroma (q.v. for etymology). Atheroma is commonly a disease of advanced life, but may be found at any age. Its occurrence is favoured by any cause which produces greatly increased arterial pressure (occupations or amusements involving very great physical exertion, excessive use of alcohol), probably also by syphilis. It commences with a chronic inflammation, with greatly increased formation of cells in the outer layers of the inner coat of the arteries, perhaps also in the middle coat. This infiltration causes destruction of the natural tissues of these coats, and consequent loss of elasticity and contractility in the parts of the artery affected. The inflamed portions of tissue undergo fatty degeneration, and may either (*a*) become so softened as to be carried away by the blood-stream, or, more commonly, (*b*) become gradually calcified—i.e. converted into bony plates by the deposition in them of chalky matter. (*a*) A portion of the wall of an artery weakened in this way rarely becomes perforated, but frequently yields to the blood-pressure, becomes dilated, and forms an *Aneurysm* (q.v.). (*b*) Calcification is much commoner, especially in old people, and may frequently be recognised in the superficial arteries by the hard feel the vessel has under the finger.

Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, whilst the larger arteries may be very much contracted. Thus the common iliac has been found to have its canal diminished by about one-half, and the great ascending branches of the arch of the aorta, the subclavian and carotid arteries, have been found very nearly closed. A later consequence of the same disease is dilatation of the vessel. The elasticity of the outer coats being insufficient to contract the artery after the distension produced by each contraction of the left ventricle of the heart, it remains distended during the relaxation of the ventricle, and thus slowly expands; the enlargement being most marked at parts where there is most obstruction to the blood-current, as, for example, in curved arteries. These changes have also an effect on the retractile power of the arteries. A healthy artery, if cut across, may shorten to the extent of an inch or more; but the retractile power is destroyed by the deposition of bony rings or plates. But although incapable of shortening, the arteries sometimes become abnormally lengthened, and consequently become not only dilated, but also tortuous. All these changes produce great interference with the normal circulation of the parts whose arteries are affected; and where the disease is advanced, a cause that would otherwise be trivial may lead to serious results—e.g. softening of the brain, gangrene of the limbs, &c.

Another condition involving much danger is this: an ossified artery loses the smoothness which the interior of the vessel ought to present, and from the displacement or cracking of a bony plate, there may be sharp rough projections exposed, to which the fibrin of the circulating blood may adhere. These little clots becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus presenting cases of embolism or Thrombosis (q.v.). Again,

the relation of this disease to accidents and surgical operations on arteries is obvious. A blow or strain may rupture a diseased artery, when a healthy elastic vessel might have escaped injury. Such a slight movement as suddenly lifting the arm to the head, for the purpose of securing the hat in a sharp gale, has been known to be followed by aneurism of the axillary artery (Syme). A ligature applied to any calcified artery is very apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due.

Atheroma can be detected in the living subject only in its advanced stages, and its presence is often revealed by the occurrence of some secondary disease or symptom.

Another form of chronic inflammation of the arteries is met with in syphilis. It consists in a uniform thickening of the inner coat of the vessel, without the degenerative changes of atheroma, but with great diminution of its calibre, and consequent interference with the circulation. It is best seen and most important in the brain, where it often leads to softening.

Embolism is the name given to the obstruction of an artery by a plug carried to it from another part of the body. This may follow atheroma (see above), but is most commonly a consequence of the detachment of a mass of fibrin from a diseased heart. Any artery may be obstructed by embolism; the consequences are most serious in the brain, the retina, and the limbs. In the larger arteries of the brain, embolism causes symptoms and results very similar to Apoplexy (q.v.); in the retina, it causes sudden and often complete loss of vision (see EYE, *Diseases of*).

When the principal artery of one of the limbs is 'suddenly plugged in its higher part, a sensation of severe pain is commonly the immediate result of the accident. In some cases, the pain extends along the course of the vessel, which, though pulseless, is extremely tender; in others, the suffering is referred to some distant part of the limb, as, for instance, to the calf. Signs of a deficient circulation succeed, and they may amount to pallor, loss of temperature, numbness of the surface, or even to that torpor which is observed to precede the total death of a limb in certain cases of injuries of vessels.' Although Gangrene (q.v.) is always to be feared as the result of an obstructed artery of large size, it does not invariably follow; as a collateral circulation may be established, and the life of the limb may be thus saved. Very young persons will endure the obliteration of very large vessels without gangrene; and a case is on record in which 'all the main arteries of both upper extremities and of the left side of the neck were reduced to solid cords,' and yet no gangrene ensued. From the description of the symptoms, the nature of a case of sudden occlusion of a large artery by a plug may possibly be recognised, or at all events suspected, even by a non-professional observer. Medical aid must at once be sought. The early indications of treatment are to preserve the temperature of the part, to favour the establishment of a collateral circulation, to protect the limb from irritation or injury, to give nourishing blood-making food, and to relieve pain by the judicious use of opiates. The later treatment, if the affection is not checked, is that which is described in GANGRENE.

Arteriotomy, or the opening of an artery, is an operation that has been strongly advocated in those cases in which it is desirable to produce a more decided and immediate depletion of the cerebral circulation (as in severe forms of sanguineous apoplexy, than could be produced by ordinary

venesection. It is supposed by some surgeons to relieve pressure on the brain more efficiently than opening the jugular vein could do; and whether this is the case or not, it is a simpler and less dangerous operation. The only vessel operated on is either the temporal artery itself or one of its main branches, which is partially divided and allowed to bleed. The operation is a simple one, but should of course only be undertaken by a surgeon. To arrest the flow of blood when sufficient has been taken, the artery should be completely divided to allow its cut ends to retract; and after the surrounding parts have been sponged, a compress, or small pad, should be applied to the wound, and secured by a bandage, which must be carefully adjusted, so as, if possible, to remain undisturbed for four or five days, when it may be removed, and the wound covered with a strip of plaster.

Artesian Wells are perpendicular borings into the ground, through which water rises from various depths, according to circumstances, above the surface of the soil. The possibility of obtaining water in this way in a particular district depends on its geological structure. All rocks contain more or less water. Arenaceous rocks receive water mechanically, and according to their compactness and purity, part with a larger or smaller proportion of it. A cubic yard of pure sea-sand can contain about one-third of its bulk of water. It would part with nearly the whole of this into a well sunk in it, and regularly pumped from. Chalk and other rocks, composed of fine particles, closely compacted together, contain as large a proportion of water; but from the power of capillary attraction, little or none of this water would be drained into a well sunk in such rock. From the existence, however, of numerous crevices in chalk through which the water freely flows, and from the general presence of a larger quantity of water than the porous rock is able to retain, wells sunk in chalk often yield water. There is yet a third class of rocks, which are perfectly impervious to water: such are clays, which are absolutely retentive, neither allowing water to be obtained from them nor to pass through them. When such rocks occur in Basins (q.v.) in alternating layers, and in such order that pervious beds are inserted between impervious ones, it is evident that if a perforation is made through the retentive barrier-bed in the lower portion of the basin, the water contained in the water-logged strata will rise through the bore to a height depending upon the pressure of water which has accumulated in the confined sloping space between the two impervious beds. The explanation will be more evident by a reference to the accompanying figure, which may be considered as a diagrammatic section of the London



Section of the London Basin.

basin. There are here a number of porous beds, *b*, composing the cretaceous measures, resting on the impervious gault, *c*, and these, again, are covered by the equally impervious series of the London clay, *a*, which form the strata on the surface, and extend to a considerable depth. The edges of the chalk-beds are largely exposed in the higher grounds around London; the water falling on the

whole area of these exposed edges, sinks into the more or less porous cretaceous beds, and would, in course of time, by continued accessions, fill up the basin, were it not prevented by the clay above. By driving a bore, *d*, through this superior bed, the inferior water-logged strata are reached, and the subterranean water rises to the surface, and flows continuously, by means of hydrostatic pressure.

Many such wells exist in London and its vicinity; those which, since 1844, have supplied the ornamental fountains in Trafalgar Square descend into the upper chalk to a depth of 393 feet. The most famous artesian well perhaps is that of Grenelle, near Paris, which was bored in 1833-41, and whose water is brought from the gault at a depth of 1798 feet. It yields 516½ gallons of water in a minute, propelled 32 feet above the surface; temperature, 8-7 F. An artesian well bored at Pesth in 1868-79, yields, at a depth of 3182 feet, water of a temperature of 165° F. In the United States, numerous artesian wells have been sunk, some of great depth, among which are two in St. Louis, Missouri, 2197 and 3843½ feet deep respectively; several in Chicago of from 700 to 1200 feet in depth; one in Louisville, Kentucky, 2086 feet deep; one in Columbus, Ohio, 2775½ feet in depth, with many others from 500 to 2000 feet deep.

The Chinese and Egyptians were early acquainted with artesian wells. The oldest known in Europe is at Lillers, in Artois (hence the name *Artesian*), and was sunk in 1126. They have been in use for centuries in Austria, especially in the neighbourhood of Vienna, where formerly the boring for them was conducted in a rude and empirical manner. As soon as geology took the position of a science, and the theory of artesian wells was propounded, the engineer was able, after the geological survey of a district, to discover whether a supply of water could there be obtained in this way. Already, districts formerly dry and arid have received a plentiful supply of water by means of such wells, and many more applications have yet to be made. Artesian borings have been executed in the Sahara from remote antiquity, and new ones have been opened by the French in the Algerian Sahara with remarkable success. In the province of Constantine alone there are more than 150. The result is proving beneficial not only to the country materially, but also to the character and habits of its nomadic Arab inhabitants. Several tribes have already settled down around these wells, and forming thus the centres of settlements, have constructed villages, planted date palms, and entirely renounced their previous wandering existence.

Artesian wells have supplied a portion of the data upon which the internal temperature of the earth has been calculated. They have their origin below that zone which is affected by the changing superficial temperature of the seasons, and consequently the water is of a constant temperature. Thus the Grenelle artesian well has a temperature of 81°·7 F., while the mean temperature of the air in the cellar of the Paris Observatory is only 53°. MM. Arago and Walferdin observed the temperature as the work proceeded, and found that there was a gradual and regular increase downwards. Walferdin also made a series of very accurate and careful observations on the temperature of two borings at Creuzot, within a mile of each other, commencing at a height of 1037 feet above the sea, and going down to a depth, the one of 2678 feet, the other about 1900 feet. The results, after every possible precaution had been taken to insure correctness, gave a rise of 1° F. for every 55 feet down to a depth of 1800 feet, beyond which the rise was more rapid, being 1° for every 44 feet of descent.

Artevelde, JACOB VAN, a Flemish popular leader in the 14th century, was a wealthy and high-born baron of Ghent. In 1335, when war was raging between England and France, he gave his support to the former power, while the Count of Flanders sided with the latter; and he actually concluded a treaty with Edward III. Proclaimed governor of Flanders, for nine years he was almost absolute ruler; but he went too far when, in 1345, he proposed that the Black Prince should be elected Count of Flanders. For this the Flemings were not prepared, and Artevelde was killed in a popular insurrection, July 24, 1345. His Philip van Artevelde in 1381 headed a new revolt of the people of Ghent, and gained a victory over the Count of Flanders, the son of his father's old enemy. The count therefore sought the assistance of Charles VI. of France, and Philip was defeated and slain at Roosebeke, 1382. His history forms the theme of a fine drama by Sir Henry Taylor. See Hutton, *James and Philip van Artevelde* (1883).

Arthritis, inflammation of the joints. See JOINTS, RHEUMATISM, GOUT.

Arthropoda. In this great division of the animal kingdom, the body consists of a usually definite number of segments, each bearing a pair of hollow and almost always jointed limbs, into which the body muscles proceed.

In all cases, the epidermis gives rise to an external horny layer of *Chitin* (q.v.), which usually attains considerable strength and thickness, and in crustaceans is further strengthened by impregnation with salts of lime. The segments of the body and their corresponding appendages exhibit a considerable degree of differentiation, especially in the anterior region of the body, where also some or many segments may completely coalesce, their appendages also becoming extraordinarily modified for various functions; so that it requires the combined research of both the embryologist and the comparative anatomist to analyse the organism into its constituent parts. The nervous system consists of a brain above the mouth, and of a ventral chain of ganglia united by longitudinal and transverse commissures; a nerve-ring round the oesophagus connects the ventral chain with the brain above. One pair of ganglia is developed for each segment, although some of these also coalesce more or less completely in the adult.

The Arthropoda divide naturally into two great alliances—the water-breathers or Branchiata (see GILLS), and the air-breathers or Tracheata (see RESPIRATION); the former including the Crustacea, and the latter the Prototracheata or Peripatidea, the Myriapoda, the Arachnida, and the Insecta. The relation of the Arthropoda to other groups will best be understood from ZOOLOGY. Separate articles will be found on the CRUSTACEA, MYRIAPODA, ARACHNIDA, and INSECTS. A distinct class has been recently established for the genus *Peripatus* (q.v.), which persists as a survivor of the ancestral insects. In several of its characters, it links together the worm and arthropod types, and gives a new basis to Cuvier's union of the two under the title Articulata.

Arthur, king of the Siluri or Dumnonii—British races driven back into the west of England by the Saxons—is represented as having united the British tribes in resisting the pagan invaders, and as having been the champion, not only of his people, but also of Christianity. He is said to have lived in the 6th century, and to have maintained a stubborn contest against the Saxon Cerdic, but the Saxon Chronicle is suspiciously silent as to his warfare and as to his existence. Indeed the Welsh bards of the earliest period do not assert that he was a

contemporary, and it is more than doubtful whether he is an historic personage. It is worthy of remark that the fame of Arthur is widely spread; he is claimed alike as a prince in Brittany, Cornwall, Wales, Cumberland, and the lowlands of Scotland; that is to say, his fame is conterminous with the British race, and does not extend to the Goidels or Gaels. As is now well known, Great Britain was twice invaded by races of Celtic blood and tongue; the first wave was that of the Goidels, and after a lapse of some considerable time, a second Celtic wave, that of the Britons or Britons from the east, overran Britain, and drove the Gaels to west and north. Fionn and Ossian belong to the mythic heroic cycle of the Gaels, and Arthur and Merlin to that of the Britons. These several shadowy forms are probably deities shorn of their divinity and given historic attributes and position, much as, among the Norsemen, Odin, when he ceased to be regarded as the All-father or God, came to be reckoned as an ancestor of the kings.

In the lays of the Welsh bards, supposed to be as early as the 6th and 7th centuries (although no MS. is extant of older date than the 12th century), Arthur and his brave companions are celebrated, but modestly and without marvels. It is possible that there may have existed in the 6th century a prince bearing the already well-known heroic name; and if so, about him the myths belonging to the remote ancestor or god have crystallised. The legendary additions begin to gather in the history of the Britons by Nennius, a writer supposed to have lived at the beginning of the 7th century, but Mr Thomas Wright has shown (*Biographia Literaria*, Saxon period) that his history is a forgery of a much later date, probably of the 10th century. Mr Skene, however (*The Four Ancient Books of Wales*, vol. i. pp. 50-60), makes light to give Arthur an historic place, and we do not deny that there may have been a prince of that name. Next in order come the so-called Armoric collections of Walter, Archdeacon of Oxford (latter part of 11th century), from which Geoffrey of Monmouth (q.v.) professes to translate, and in which the marvellous and supernatural elements largely prevail. Here for the first time the magician Merlin comes into association with Arthur. According to Geoffrey, Arthur's father Uther, conceiving a passion for Igraine, wife of Gorlois Duke of Cornwall, is changed by Merlin into the likeness of Gorlois, and Arthur is the result. After his father's death, Arthur becomes paramount leader of the British, and makes victorious expeditions to Scotland, Ireland, Denmark, Norway, and also to France, where he defeats a great Roman army. During his absence, his nephew Modred revolts, and seduces Prince Arthur's wife, Gweniver (Gwenhwywar). Arthur returning, falls in a battle with his nephew, and is carried to the Isle of Avalon (q.v.) to be cured of his wounds. Geoffrey's work apparently gave birth to a multitude of fictions which came to be considered as quasi-historical traditions. From these, exaggerated by each succeeding age, and recast by each narrator, sprung the famous metrical romances of the 12th and 13th centuries, first in French and afterwards in English, from which modern notions of Arthur are derived. In these, his habitual residence is at Caerleon, on the Usk, in Wales, where, with his beautiful wife Guinevere, he lives in splendid state, surrounded by hundreds of knights and beautiful ladies, who serve as patterns of valour, breeding, and grace to all the world. Twelve knights, the bravest of the throng, form the centre of this retinue, and sit with the king at a round table, the 'Knights of the Round Table.' From the court of King Arthur, knights go forth to all countries in search

of adventure—to protect women, chastise oppressors, liberate the enchanted, enchain giants and malicious dwarfs, is their knightly mission.

The earliest legends of Arthur's exploits are to be found in the bardic lays attributed to the 6th and 7th centuries (*Mygyrian Archaeology of Wales*, 1801). A Welsh collection of stories called the *Mabinogion*, of the 14th and 15th centuries, and translated into English by Lady Charlotte Guest in 1849, gives further Arthurian legends. Some of the stories 'have the character of chivalric romances,' and are therefore probably of French origin; while others 'bear the impress of a far higher antiquity, both as regards the manners they depict, and the style of language in which they are composed.' These latter rarely mention Arthur, but the former belong, as Mr Skene puts it, to the 'full-blown Arthurian romance,' Chrétien de Troies, the most famous of the old French trouvères in the latter part of the 12th century, made the Arthur legend the subject for his *Romans and Contes*, as well as for two epics on Tristan; the Holy Grail, Peredur, &c. belonging to the same cycle. Early in the same century, the Arthurian metrical romance became known in Germany, and there assumed a more animated and artistic form in the *Parzival* of Wolfram of Eschenbach, *Tristan and Isolde* of Gottfried of Strasburg, *Erec and Iwein* of Hartmann, and *Wigalois* of Wirnt. The most renowned of the heroes of the Arthurian school are Peredur (Parzival or Percival), Tristan or Tristram, Iwein, Erec, Gawain, Wigalois, Wigamur, Gauriel, and Lancelot. From France the Arthurian romance spread also to Spain, Provence, Italy, and the Netherlands, even into Iceland, and was again retransplanted into England. One of the publications that issued from the press of Caxton (1485), was a collection of stories by Sir Thomas Malory, either compiled by him in English, from various of the later French prose romances, or translated directly from an already existing French compendium. Copland reprinted the work in 1557, and in 1634 the last of the black-letter editions appeared. A reprint of Caxton's *Kyng Arthur*, with an introduction and notes, by Robert Sonthey, was issued in 1817 (*The Byrth, Lyfe, and Actes of Kyng Arthur*, &c. 2 vols. 4to). The most complete edition is that by Thomas Wright (Lond. 3 vols. 1866) from the text of 1634.

The name of King Arthur was given during the middle ages to many places and monuments supposed to have been in some way associated with his exploits, such as 'Arthur's Seat' near Edinburgh, 'Arthur's Oven' on the Carron near Falkirk, &c. What was called the sepulchre of his queen was shown at Meigle, in Strathmore, in the 16th century. Near Boscastle, in Cornwall, is Pentargain, a headland called after him 'Arthur's Head.' Other localities take his name in Brittany. In the middle ages in Germany, Arthur's Courts were buildings in which the patricians assembled. One such still remains at Danzig. There was one anciently at Thorn, about which a ballad and legend exist. Milton was meditating an Arthurian epic in 1639; and in our own day the interest of the legends about King Arthur and his knights has been revived by Tennyson's *Idylls of the King* (1859 et seq.), and some of Wagner's operas. We must not omit to note the magnificent life-sized ideal bronze figure of Arthur, east for the monument of Maximilian I., now in the Franciscan church at Innsbruck, and regarded as the finest among the series of heroes there represented.

See Villenarqué, *Contes Populaires des Anciens Bretons* (1842); and his *Poèmes des Bardes Bretons du 6^e Siècle* (1850); Holtzmann, 'Artus' in Pfeiffer's *Germania*

(1867); San-Marto (A. Schulz), *Die Arthursage* (1842), and his *Beiträge zur Breton. u. Celt.-German Heldensage* (1847); also Rhys, *Celtic Britain* (1882); Grässe, *Sagenkreise des Mittelalters* (1842); Skene's *Four Ancient Books of Wales* (1868); Glennie's *Arthurian Localities* (1869); Cox's *Popular Romances of the Middle Ages* (1871); Fontan, *Arthur, ou le Roi-chasseur* (1874).

Arthur. PRINCE, the posthumous son of Geoffrey (Henry II.'s fourth son) by Constance, Duchess of Brittany, was born in 1187. On Richard's death in 1199, Arthur, by the law of primogeniture, should have succeeded to the English crown; and the French king, Philip II., upheld his claims, until John (q.v.) bought him over to a disgraceful treaty. Arthur soon after fell into his uncle's hands, and was imprisoned, first at Falaise, afterwards at Rouen, where, on 3d April 1203, he is supposed to have perished, either by assassination or by drowning in an attempt to escape. The story of John's orders to Hubert to put out his eyes was current as early as 1228, and is treated in a celebrated scene of Shakespeare's *King John*.

Arthur. CHESTER ALAS, twenty-first president of the United States, was born at Fairfield, in Franklin County, Vermont, on the 5th October 1830. His father was the Rev. W. Arthur, D.D., a Baptist minister, and a native of the north of Ireland. He distinguished himself as a student at Union College, New York; and devoting himself to law studies, was admitted to the bar in 1853. After having practised for some years, he was made a judge-advocate; at the outbreak of the great civil war he held the post of Inspector general; and during the war was Quartermaster-general for the New York forces. He subsequently returned to law practice, and became the head of a very eminent law firm. Arthur took a prominent share in politics, on the Republican side; and in 1871 President Grant appointed him Collector of Customs at the port of New York. As being hostile to the reform in the civil service aimed at by President Hayes, he was removed from this post in 1878, and again returned to the practice of law. He was a leader of the Republican party in the State; and though belonging to the section of the Republicans opposed on the question of civil service reform to that represented by General Garfield, was made vice-president of the United States when Garfield became president in 1881. The death of Garfield, caused by the effects of an assassin's pistol-shot, called the vice-president to the supreme magistracy of the union; and Arthur was installed as president on the 22d September 1881, and held the office till 4th March 1885, when he was succeeded by Grover Cleveland, who had been the Democratic candidate. During his term of office two important measures were passed by congress in 1882—a bill dealing with the Mormon question, and declaring polygamy illegal, and the other dealing with the Chinese question. A tariff bill with Protectionist bearings was passed in 1883. He was neither a great nor a brilliant president, but he was practical, business-like, and honourable in the fulfilment of his duties. He died November 18, 1886.

Arthur's Seat, a well-known lion-shaped hill immediately east of Edinburgh, rising to a height of 822 feet above sea-level. The ascent is easy, and the prospect from the top unrivalled. Arthur's Seat is supposed to derive its name from the British king. When the hill received this appellation is not known; but at the close of the 15th century, the poet Kennedy mentions 'Arthur Sate or only higher hill.'

The hill consists partly of aqueous sedimentary rocks, and partly of volcanic rocks. The aqueous strata are of carboniferous age, and are overlaid

by a succession of beds of basalt and porphyrite, with intercalated beds of fragmental volcanic materials. These bedded rocks are traversed by irregular sheets of dolerite and basalt, which form the mural cliffs of Salisbury Crags, Sanson's Ribs, &c. The bedded igneous rocks point to subaqueous volcanic action in carboniferous times. At some subsequent period—long after the carboniferous strata had been elevated, folded, fractured, and much denuded—volcanic action again broke out on the site of Arthur's Seat. The rocks ejected at this later period are represented by the coarse volcanic agglomerate and overlying dolerite, &c. of the Lion's Haunch, and the basalt of the summit of the hill—this latter occupying the pipe or throat of the younger volcano.

Artichoke (*Cynara Scolymus*), a thistle-like perennial plant belonging to the tubulifloral group of composites, now growing wild in the south of Europe, but probably a native of Asia. The radical leaves are 3 to 4 feet long, somewhat spiny, pinnatifid, or undivided. The stem is 2 or 3 feet high, branched, with large heads of violet-coloured (sometimes white) thistle-like flowers at the summits of the branches. The plant has been long cultivated for the sake of the delicate succulent receptacle or broadened axis of the flower-head, taken before the flower expands, which is boiled and eaten with melted butter, or sometimes eaten raw with salt and pepper. The part used is the same which is called the *chercé* in thistles by children, and is sometimes eaten by them. The tender central leaf-stalk is also occasionally used



Artichoke.

in the same way as that of the Cardoon. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 feet asunder, and 2 feet apart in the row. The artichoke bed continues productive for several years. Sea-weed is an excellent manure. The Cardoon (q.v.) belongs to the same genus. The Jerusalem Artichoke (q.v.) is a totally different plant, being a kind of sunflower (*Helianthus tuberosus*).

Articles of Association are the printed regulations for the conduct of the business of a joint-stock company registered under the Companies Acts. They are stamped as a deed, and signed by the subscribers to the memorandum of association. These two documents are then registered by the registrar of joint-stock companies, who grants a certificate of incorporation. Each member is entitled to have a copy of the articles and memorandum for one shilling. The Companies Act, 1862, gives in Schedule A, model regulations

(97 in number), which form the Articles of Association for every company limited by shares, except in so far as they may be expressly altered by the company. The most important articles deal with calls on shares, transfer of shares, forfeiture of shares, meetings, powers of directors, dividends, &c. See COMPANY.

Articles of War, ordinances for the government of troops, seamen, and camp-followers, by punishing, as crimes, acts or omissions which, in civil life, would be mere breaches of contract—e.g. desertion or disobedience of orders. *Military Articles of War* were, prior to the passing of the first Mutiny Act (q.v.) in 1689, the only ordinances for regulating discipline amongst the troops raised, from time to time, for each campaign. They were issued by the crown or by the commander-in-chief, in pursuance of authority conferred by the crown, for each campaign, and ceased to operate on its conclusion. This prerogative power, dating from the Conquest, was superseded in 1803 by a corresponding statutory power, expressed in section 69 of the Army Act of 1881, but not likely to be used. The earliest complete code, dated 1385, is the 'Statutes, Ordinances, and Customs' of Richard II. Articles of War were then issued by Henry V., Henry VII., and during the great Rebellion by both sides, in almost identical language; those of Lord Essex were published under an ordinance of the Lords and Commons. Charles II. and James II. also issued Articles of War. The former, dated 1672, formed the groundwork of those issued in 1878, which were consolidated with the Mutiny Act in the Army Discipline and Regulation Act of 1879, now replaced by the Army Act of 1881 (see ARMY DISCIPLINE); but the earlier Articles were of excessive severity—death or loss of limb for almost every crime. The United States Articles of War are published in the annual Army Regulations, and cover generally the same ground as those of England. Sentences of death by courts-martial, as in the United Kingdom, must be concurred in by at least two-thirds of the members, and, with few exceptions, must be confirmed, before execution, by the president of the United States.

Naval Articles of War are similar in every respect to those for the army, and, like them, have been incorporated in a Naval Discipline Act, of which they form the first section. The power of the Admiralty to make Articles of War for the government of the Marines is recognised in section 179 of the Army Act, under which this body is disciplined when not borne on the books of a man-of-war in commission.—In the United States, marines are subject to the regulations for the army or navy, according as they happen to be engaged with either branch of the service; the Naval Articles being, however, essentially the same as those governing the army.

Indian Articles of War are a distinct and special body of regulations, and apply only to officers, soldiers, and camp-followers who are natives of India.

Articles. The Six, were imposed by act of parliament in 1539, when, Henry VIII. being displeased with some of the bishops most favourable to the Reformation, their opponents for a time regained the ascendancy. These articles asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing them was popularly called 'the six-stringed whip.' Severe penalties were appointed for writing or speaking against them, and for

abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Crammer vainly opposed the act in the House of Lords: the king was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and although it continued substantially unrepealed, it was transgressed with impunity even by ecclesiastical dignitaries.

Articles. The Thirty-nine, of the Church of England, are the articles of religion which were agreed upon by the archbishops and bishops of both provinces and the whole clergy in the convocation held at London in the 4th year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, forty-two in number, in the reign of Edward VI. The council appointed by the will of Henry VIII. to conduct the government during the king's minority, was for the most part favourably disposed towards the Reformed opinions, and the management of church affairs devolved almost entirely upon Archbishop Crammer. In the year 1549, an act of parliament was passed, empowering the king to appoint a commission of 32 persons, to make ecclesiastical laws. Under this act, a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (amongst whom were Crammer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, and Justice Hales), was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were forty-two in number, and were set forth by the king's authority in 1553. Strype makes it appear that these forty-two articles were agreed upon in the convocation that was sitting in 1552, but his assertion has been much questioned. Against Strype may be cited not only Fuller, but also Burnet, Lamb, and Palmer. But perhaps the best authority on the subject, Archdeacon Hardwick, in his *History of the Articles of Religion* (1859), makes it appear highly probable that Strype's view was correct. To these articles was prefixed the Catechism, and there is no doubt that Crammer had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication, Edward died, and one of the first acts of the convocation summoned with the parliament in the first year of Queen Mary, was to declare that these forty-two articles had not been set forth by the agreement of that House, and that they did not agree thereto. In 1558 Elizabeth succeeded her sister. In 1559 Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled up. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed Church. Parker applied himself to this work, and, for the purpose, revised the forty-two articles of King Edward, rejecting four of them entirely, and introducing four new ones—viz. the 5th, 12th, 29th, and 30th, as they now stand, and altering more or less seventeen others. This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to thirty-nine. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to

thirty-eight. From these thirty-eight there was a further omission—viz. of the first half of the 20th article, which declares that 'the church hath power to decree rites and ceremonies, and hath authority in controversies of faith.' As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571 the articles once more underwent revision, Archbishop Parker and Bishop Jewel making a few trifling alterations, and the 20th being restored. The convocation which was then sitting ratified them both in Latin and English, and an act of parliament was passed in that year compelling the clergy to subscribe 'such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments.' There still, however, remained some difficulty as to which was the authorised copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the thirty-nine articles as they now stand. 'His Majesty's Declaration,' which precedes them, and directs that they shall be interpreted 'in their literal and grammatical sense,' was prefixed by Charles I. in 1628.

It may be interesting to know from what other sources the thirty-nine articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording, with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. Some of them, as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII., and annotated by the king's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it only existed in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melancthon.

The thirty-nine articles have been described as 'containing a whole body of divinity.' This can hardly be maintained. They contain, however, what the Church of England holds to be a fair scriptural account of the leading doctrines of Christianity, together with a condemnation of what she considers to be the principal errors of the Church of Rome and of certain Protestant sects. As far as they go (and there are many things unnoticed by them) they are a legal definition of the doctrines of the Church of England; though it is to the *Book of Common Prayer* that members of that communion look for the genuine expression of her faith. They were adopted by the convocation of the Irish Church in 1635, and by the Scottish Episcopal Church at the close of the 18th century. Corpus Christi College, Cambridge, contains the only copies of the Articles in manuscript or print that are of any authority. Amongst them are the Latin manuscript of the Articles of 1562, and the English manuscript of the Articles of 1571, each with the signatures of the archbishops and bishops who subscribed them.

See Hardwick's history of the Articles already cited. Amongst the commentaries upon them are those by Bishop Burnet (1669); Bishop Beveridge (1716); Bishop Forbes of Brechin (2d ed. 1871); and that most countenanced by Anglican authorities, the exposition by Dr Harold Browne, Bishop of Winchester (Lond. 12th ed. 1882). *Tract XC.*, by Cardinal Newman, illustrated the 'elasticity' of the Articles. See also the articles CREEDS and CONFESSIONS.

Articula'ta or **ARTICULATED ANIMALS**, one of the great primary divisions of the Animal Kingdom, according to the system of Cuvier (see ZOOLOGY). It included those animals of which the body is divided into a number of distinct

joints—viz. the higher worms or Annelids, and also the Insects, Crustaceans, Arachnids, and Myriapods. The four latter groups were separated from the Annelida (q.v., and see also WORMS) by Von Siebold, on account of their possession of hollow jointed limbs, into a separate sub-kingdom, Arthropoda (q.v.).

Articulate Sounds. See LETTERS.

Articulation. See JOINTS.

Artificial Flowers, &c. See FLOWERS (ARTIFICIAL), STONES (PRECIOUS), PEARLS, &c.

Artificial Limbs are mechanical contrivances adapted to reproduce the form, and as far as may be, the function of a lost or absent member. They have, in one form or other, been in use from very early times. Herodotus mentions the case of a prisoner who amputated his own foot to escape from his shackles, and, escaping to his friends, was provided with a wooden substitute. The brave M. Sergius, great-grandfather of Catiline, was consul in the year 167 B.C. He lost his right hand in his second campaign; and received twenty-three wounds, so that neither his remaining hand nor his feet were fully serviceable. Notwithstanding this, he fought in four battles with his left hand only; afterwards he made himself an iron hand, and fighting with it fastened on, was instrumental in raising the siege of Cremona, in protecting Placentia, and in storming twelve of the enemy's camps in Gaul, during the second Punic war (Pliny, *Hist. Nat.* 28, 104-106). In 1885 a remarkable specimen was discovered in a tomb at Capua along with other relics dating from 300 B.C.; it is thus described in the catalogue of the London Royal College of Surgeons, where the specimen is preserved: 'Roman Artificial Leg. The artificial limb accurately represents the form of the leg. It is made with pieces of thin bronze fastened by bronze nails to a wooden core. Two iron bars, having holes at their free ends, are attached to the upper extremity of the bronze. A quadrilateral piece of iron, found near the position of the foot, is thought to have given strength to it. There was no trace of the foot, and the wooden core had nearly all crumbled away. The skeleton had its waist surrounded by a belt of sheet bronze, edged with small rivets, probably used to fasten a leather lining. The upper third of the leg was hollow, while the lower two thirds were filled with wood.'

The celebrated artificial hand of the German knight, Gotz von Berlichingen—'Götz of the Iron Hand'—was invented about 1504 by a mechanic of Nuremberg. It weighed three pounds, and was so constructed as to grasp a sword or lance. In the twelfth chapter of Ambrose Paré's *Œuvres de Chirurgie*, as translated by Thomas Johnson in 1605, it is described 'by what means arms, legs, and hands may be made by art, and placed instead of the natural arms, legs, and hands that are cut off or lost.' No improvements worthy of record were made from the time of Ambrose Paré till the beginning of the present century, when Baillif of Berlin constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat, and even a pen. Recent years have seen great advances in the adaptation of these mechanical contrivances to varied requirements. The first desideratum in an artificial limb is lightness. This applies equally to both upper and lower extremities. In other respects, however, important differences exist between what is desirable in an artificial arm and what in an artificial leg. In the former, *mobility*, to the extreme limit

compatible with control over its movements, is wished for; in the latter, *stability* is chiefly thought of. The artificial arm is destined to reproduce as far as possible the prehensile powers of the lost upper extremity; the artificial leg, the weight-supporting function of the natural lower limb. In both, the mechanical appliance must fit accurately and grasp firmly the stump of the natural limb; and this without exerting injurious pressure or causing discomfort at any point.

Arms.—The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is most suitable when it tapers gradually to its lower end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one formed by amputation at the wrist. The simplest form of artificial arm after amputation above the elbow, consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight. The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated, and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, the wrist-movements are partially imitated, and a degree of natural softness given to the hand by a covering of gutta-percha and india-rubber. Nothing has tended so much to the very highest development of artificial arms and hands, as an accident which happened more than a quarter of a century ago to the celebrated French tenor, M. Roger, who lost his right arm above the elbow. It was necessary, for his future appearance on the stage, that he should have an artificial limb, which would serve the purposes of histrionic action, and permit him to grasp a sword and draw it from its scabbard. Such a contrivance was invented in 1845 by Petersen, a Prussian mechanic, and the French Academy of Sciences commissioned MM. Gumbey, Rayer, Velpéau, and Magendie to report upon it. The apparatus, which weighed less than 18 ounces, was tested upon a soldier who had lost both arms. By its aid he was enabled to pick up a pen, take hold of a leaf of paper, &c. Petersen's conceptions were improved by Messrs. Charrière, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very perfect artificial hand has been invented by Mr Heather Bigg, in which voluntary and variable movement is conferred on the thumb by a closed hydraulic apparatus. By compressing an india rubber ball placed under the amput, a piston is worked that can open or close the grasp of the thumb, with gentle or with forcible pressure as required. This added automatic mobility is a great advance in the construction of such appliances. (See H. Bigg, *Artificial Limbs and Amputations*, 1885.)

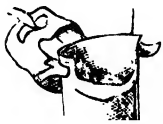


Fig. 1.

The Beaufort arm (fig. 1) possesses a similar 'instinctive' power of movement. It consists of a wooden hand attached to a leathern socket that firmly fits the

stump. The fingers are half-closed parallel to one another, the first two finger-tips opposing that of the movable thumb. The thumb is pivoted on a pin concealed in the ball of the thumb; it is firmly pressed against the finger-tips by a strong india-rubber band similarly concealed. A piece of whipcord is attached to the back of the thumb, whence it runs upwards to the shoulder of the wearer, and across his back to the opposite shoulder, around which it is fastened by a tape loop. By drawing upon and relaxing the whipcord, the grasp of the thumb is alternately opened and closed; and these movements can be attained by slight movements of the shoulders, or by advancing and retracting the artificial arm. This arm was adopted by the French government for distribution to soldiers maimed in the Franco-German war of 1870-71. It is a remarkably efficient appliance, and has the advantage of cheapness, so that it is within the reach of all classes.

Legs.—The object in view here is to support weight, and to supply movement useful in progression. Weight can be borne in three ways in an artificial leg: (1) On the end of the stump; (2) by the contact-friction between the surface of the limb and a tightly fitting sheath; and (3) on the tuberosity of the ischium or 'sitting bone.'

The simplest artificial leg is the 'bucket' leg (fig. 2), consisting of a hollow wooden or leathern sheath, A, fitting accurately to the contour of the stump, and having a 'peg,' B, firmly attached to its lower end. The weight is here chiefly borne by the 'sitting bone,' which reposes on the smooth brim of the 'bucket.' The end of the stump should not quite reach the floor of the 'bucket,' hence it takes no part in supporting the weight of the body, which might give rise to pain in the stump. This appliance is suited only for amputation through the thigh. Its great defects are the absence of bending at the knee, and the absence of a foot, which makes it useless on soft ground.

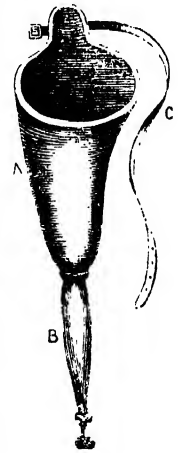


Fig. 2.

Of the more complicated forms of artificial leg three are especially popular. The first of these is of English origin, and owing to its having been adopted by the Marquis of Anglesey, is known as the *Anglesey leg*; it is fully described in Gray's work on *Artificial Limbs*. The second is that invented by an American named Palmer, and called the *Palmer leg*. From its lightness and the greater ease of walking with it, it soon superseded the Anglesey leg in America. In the third, also invented in America, and known as *Dr Bly's leg*, the principal faults of the two other legs have been completely overcome. The advantages of this leg are thus summed up by Mr Bigg: (1) Adaptation to all amputations either above or below the knee. (2) Rotation and lateral action of the ankle-joint. (3) Power on the part of the patient to walk with ease on any surface, however irregular, as, owing to the motion of the ankle-joint, the sole of the foot readily accommodates itself to the unevenness of the ground. (4) The ankle-joint is rendered perfectly indestructible by ordinary wear, owing to its centre being composed of a glass ball resting in a cup of vulcanite. (5) The action of the ankle-joint is created by five tendons, arranged in accordance with the position

assigned to them in a natural leg. These tendons are capable of being rendered tight or loose in a few seconds, so that the wearer of the leg has the power of adjusting with precision the exact degree of tension from which he finds the greatest comfort in walking. (6) There is a self-acting spring in the knee-joint, urging the leg forward in walking, and imparting automatic motion. (7) The whole is covered by a flesh-coloured enamel, which can be washed with soap and water. (8) At the knee-joint there is a mechanical arrangement representing the crucial ligaments, and affording natural action to that articulation by which all shock to the stump in walking is avoided. Hermann's artificial limb is still more highly approved by many, as affording more support when the knee is bent. See Max Schede's work on *Amputation*, and the *System of Surgery* by Holmes and Hulke (3d ed. 1883).

The Beaufort leg (fig. 3), invented by the Count de Beaufort in 1851, and improved subsequently,

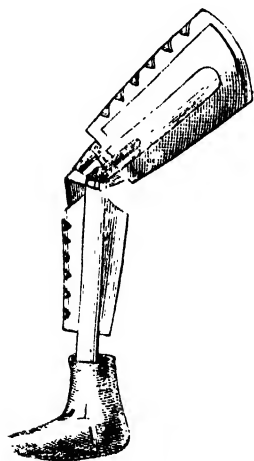


Fig. 3.

has three great recommendations: it lengthens the stride that can be safely taken, it reproduces the natural gait, and it is remarkably cheap. Baron Larrey, the celebrated French surgeon, reported on this invention to the Academy of Medicine, that 'it consists of a piece of ash-wood, which, like the peg, is attached to the ordinary wooden leg. It replaces the metal disc of the peg, and is shaped somewhat like a foot, but shorter in length. The plantar surface is covered with a leathern sole, garnished with cork at the heel. It is curved

in form, the curve being such as to give the limb continuous lines of bearing on the ground while the body moves forward, save that the curve is not so perfectly uniform as to involve any danger of slipping. He shows how the curved sole is instrumental in increasing stability, in lengthening the pace, and in giving it a natural character. In 1865 this new form of foot was adapted to a new leg case, with lateral supports of ash-wood, and a joint corresponding to the knee, applicable to cases of amputation of all sorts. These limbs are now made in London by the Provident Surgical Appliance Society. For artificial eyes, noses, palates, teeth, see EYE, RHINOPLASTIC OPERATIONS, PALATE, DENTISTRY, TEETH.

Artillery originally meant any projectile weapon or engine of war, even bows and arrows and slings; now it means either cannon of any description or the soldiers who manage the cannon. It is here used in the latter sense; the description of various kinds of ordnance will be found either under CANNON or under their special names. *Park of Artillery* is a collective name given to the whole of the guns, carriages, ammunition, and other appurtenances essential to the working of a field or siege army.

Artillery Corps.—The introduction of field-guns necessitated the formation of a body of men set apart to study the force and action of gunpowder, the flight and range of projectiles, the weight and strength of cannon, and the manœuvring of heavy masses of field artillery; and after the great wars

in the beginning of the present century, artillery had become the third great branch of military service, after the infantry and cavalry.

Artillery is divided into two classes, field and siege (sometimes called fortress or garrison artillery). The former is divided into *Batteries* (q.v.) as tactical units, and, besides the highly trained horse, field, and mountain, there are rocket and position batteries formed when necessary. In time of peace, a few of the latter class exist in India, where the guns are drawn by bullocks and manned by men of the garrison artillery. Siege or fortress artillerymen are grouped into regiments, battalions, &c., like infantry, for administrative purposes, in all armies except that of Great Britain (see below). Marine artillerymen, though belonging to the navy and working ships' guns, are to be classed as siege artillery. They are organised like infantry.

The *Royal Regiment of Artillery* is the collective name for the whole of the artillery belonging to the British army. Formed first in 1715, constant additions have been made to the same regiment, and it is now almost an army in itself, comprising *Horse, Field, and Garrison Artillery*. Many schemes have been originated for dividing this regiment at least into two branches, mounted and dismounted, but never fully carried out. The horse artillery, however, is separately recruited, and except that the officers revert to field or garrison artillery on promotion to await reappointment to it, may be considered a different regiment. In action, the horse artillery, having all the men mounted either on horses or on the limbers of the guns, can manœuvre with cavalry; the field artillery, carrying the gunners on the guns and wagons, and being armed with a heavier weapon, cannot move at such a rapid pace except for very short distances. The garrison artillery sometimes furnishes men to accompany guns of position (20-pounders or 40-pounders) dragged at a walk on to the field of battle by cart-horses, bullocks, or elephants, and it also mans the mountain batteries in India; but its proper duty is to work the heavy guns of forts or siege batteries.

The *Coast Brigade* consists entirely of old soldiers who are stationed in the small coast-forts, charged with the duty of looking after the magazines, stores, and guns in them. There are generally two men to each fort, and a master-gunner (see WARRANT OFFICER) superintends one or more forts under a district officer from the nearest regular battery of artillery. The officers of the coast brigade (1 major, 10 captains, and 19 lieutenants) are always promoted from the ranks, and generally placed in charge of large stores and important magazines; some act as adjutants for their districts.

In 1857, after the Indian Mutiny, the native gunners of the Bombay, Bengal, and Madras regiments of artillery were disbanded, and the officers amalgamated with those of the old Royal Artillery, but their promotion continued on their own seniority lists. These officers are gradually disappearing. A major-general holds the appointment of inspector-general of artillery, and visits every fort and sees every man in the regiment at home yearly. A deputy-adjutant-general at the War Office represents it on the general staff of the army.

A horse or field battery has 5 officers (1 major, 1 captain, and 3 lieutenants) and 151 men; and a garrison battery, 4 officers (1 major, 1 captain, and 2 lieutenants) and from 100 to 150 men, according to the guns of position in its charge. The horse artillery forms two brigades, lettered A and B, of 10 batteries each, also lettered and grouped thus for administrative purposes only. There are four similar brigades of field artillery.

These are numbered, but their batteries (20 to 23 in a brigade) are lettered. Each horse or field brigade has also a depot battery. Some batteries are armed with the new 13-pounders, some with 12-pounders, and some 9-pounders, and 12 field artillery batteries with 16-pounders. The garrison artillery is divided into 11 brigades (of 9 to 10 batteries), and each is allotted to a district or artillery division, becoming the first brigade of that division, the territorial militia artillery forming the other brigades. There is a depot battery at each divisional headquarters, recruiting from the district for the service batteries. The men enlist as 'gunners' or 'drivers,' according to their height; the standard being 5 feet 6 inches for the former, and 5 feet 4 inches for the latter. They serve 6 years, and then pass to the reserve for 6 more.

The following table from the Army Estimates of 1887-88, shows the numbers of the force :

ROYAL ARTILLERY.	
Commissioned officers.....	1,072
Non-commissioned officers.....	1,807
Rank and file.....	25,470
Horses.....	7,576
ROYAL HORSE ARTILLERY.	
Commissioned officers.....	181
Non-commissioned officers.....	271
Rank and file.....	3,978
Horses.....	2,344
Total men.....	32,779
Total horses.....	10,920

Of this number, some 12,000 men (80 batteries) are placed at the disposal of the East Indies, to be paid for out of Indian revenues.

The *Royal Malta Fencible Artillery* is practically a local regiment of artillery militia, though officially ranking, as part of the regular army, next after the 2d West India Regiment. It does not serve anywhere but at Malta.

The *Gun Lascars* of Hong-kong and Ceylon are also local militia, but are enlisted for universal service.

The *Honourable Company of Artillery* is the oldest existing volunteer corps in Britain. Together with the *Sergeants-at-arms*, the *Yeomen of the Guard*, and the *Gentlemen Pensioners*, it was established as far back as 1537, when Henry VIII. granted a patent creating the 'Fraternity or Guild of Artillery of Long-bows, Cross-bows, and Hand-guns.' In 1638 the corporation of the city of London presented to the company the Artillery Grounds, near Moorfields, for military exercises. Royal princes frequently enrolled themselves as members of the company, usually as 'captain-general.' In 1780, during the 'Lord George Gordon riots,' this company effectually protected the Bank of England; in 1818, and again in 1859, it was ready if needed, but has never been engaged in actual warfare with an enemy. Its members, elected by the ballot of a Court of Assistants, pay two guineas annual subscription, and £5 entrance fee, and supply uniforms, but not arms and accoutrements. They learn rifle shooting as well as artillery practice; meeting twice a week at Moorfields, and every summer spend some days in camp. The corps comprises six infantry companies; a troop of light cavalry, who furnish their own horses; and a battery of artillery, as well as a company of veterans. Until 1849 the members elected their own officers; but since that year the crown has appointed them. The lieutenant-colonel appoints the non-commissioned officers. The total number, of all arms, is about 600. The company is the only volunteer body allowed to march through the streets with bayonets fixed. See G. A. Rakes, *History of the Hon. Artillery Company* (2 vols. 1878-80).

Artillery Schools.—The first school for artillery instruction was established by the Venetians in the beginning of the 16th century. Soon afterwards Charles V. established similar schools at Burgos and in Sicily. The French founded a school of practical artillery in 1675; and in 1679, a theoretical school at Douai. At present France has seven such establishments. Saxony had an artillery school in 1766; but the other German states were more tardy in this work. In Prussia alone the artillery and engineer schools are combined; but in other states these two arms are separate. The officers' studies comprise mathematics, as much of physics and chemistry as is necessary to the duties of the artillery, field and permanent fortification, tactics, military history and topography, drawing, &c. The practical exercises include gun and mortar drill, siege operations, laboratory and manufacturing studies.

A *Royal Military Academy* was established at Woolwich in 1741, for the artilleryists and engineers of the royal army. The East India Company sent their artillery cadets to this academy from the year 1798 to 1810; but afterwards, until 1861, they maintained a separate establishment at Addiscombe (which, however, was not wholly for artillery). The students in the academy are admitted by fair open competition, between the ages of 17 and 20; and remain two and a half or three years, before being commissioned in the Royal Artillery or Engineers. The sons of military officers are admitted on lower terms than those of other persons. There are 22 professors and instructors of various kinds. There is also at Woolwich a *Department of Artillery Studies*, for the instruction of junior officers of artillery; an *Ordnance Select Committee*, for examining and reporting on the numerous inventions relating to artillery brought before the War Office; and the *Artillery College*, consisting of a few officers in training for the superintendence of the manufacturing departments in the Royal Arsenal. The members pass a severe qualifying examination, and attend lectures on theoretical gunnery, chemistry, applied mathematics, and metallurgy. The *School of Gunnery* at Shoeburyness is for experiments upon ordnance, gunpowder, and projectiles, and to exercise young artillery officers in the practical and mechanical duties of their profession.

In the United States, the principal artillery school is at Fortress Monroe, in Virginia. Here, under three artillery field officers, five batteries (one from each artillery regiment of the army) are in constant training, together with such officers and men as may from time to time be ordered to the school for instruction.

Artiodactyla. The great mammalian order Ungulata (see MAMMALIA, UNGULATA) is divided into two groups; first, the Perissodactyla, including the horse, tapir, and rhinoceros, besides a multitude of extinct forms, and distinguished by the third digit of each limb being symmetrical in itself, by the presence of an odd number of digits on the hind-foot, by the number of dorso-lumbar vertebrae being at least twenty-two, and so on; while the second sub-order, the Artiodactyla, possess the third digit, unsymmetrical in itself, but forming a symmetrical pair with the fourth digit. While the hind-foot bears an even number of digits, the number of dorso-lumbar vertebrae never reaches twenty-two, and rarely exceeds nineteen. Numerous minor osteological differences exist between the two sub-orders, which broadly correspond to the ancient divisions of solid-hoofed and cloven-hoofed respectively. In the article FOOT will be found some details as to the differences in the feet of various animals of the ungulate order.

The Artiodactyla again divide into two groups

—the Non-Ruminantia and the Ruminantia. The former have usually more than one pair of upper incisors, and the molars have a more or less tuberculated pattern, whence they are frequently termed *Bunodontia*. The metacarpal and metatarsal bones remain separate, and there are no horns. The stomach has rarely more than two divisions. The Non-Ruminantia include two existing families, Suidæ and Hippopotamidæ. The Suidæ (pigs) have the skin moderately thick and hairy; the third and fourth toes are much longer than the second and fifth. The teeth are frequently as many as forty-four, and the molars are multituberculate. The Hippopotamidæ have the skin extremely thick, with scanty hairs; the head, body, and limbs extremely massive; and the four toes all resting on the ground. The Ruminantia have never more than one pair of upper incisors. In the lower jaw, the canines closely resemble and are situated beside the six incisors, which thus seem to have increased to eight. The molars bear a double series of crescentic ridges, whence the name *Selenodontia* is frequently applied to the ruminant group. The stomach has at least three, and usually four divisions. Thus in the sheep or ox, the cardiac portion of the stomach is differentiated into the enormous *rumen* or paunch, and the *reticulum* or honeycomb stomach, with which it communicates. After the fodder has been chewed again, it passes readily into the third division, the *psalterium*, or manyplies, which acts as a filter, and only allows the finely comminuted portions of the food to enter the highly glandular *abomasum* or rennet stomach, in which gastric juice is secreted, and proteid digestion goes on.

The existing groups of ruminants are the Tragulidæ, the Cotylophoræ, and the Camelidæ. The Tragulidæ (sometimes erroneously termed musk-deer) are the least differentiated forms, and show interesting affinities to the non-ruminants. The Cotylophoræ, including the ox and deer tribes (Bovidæ and Cervidæ), are the central family, which are broadly distinguished by the cotyledonary placenta, and the structure of their horns; those of the Cervidæ being naked, deciduous, and annually renewed processes of the frontal bones; while those of most Bovidæ (sheep, antelopes, oxen, buffaloes) are non-deciduous processes of the frontal bones, covered by the thickened and hardened epidermis known as horn. But in one sub-family, the giraffes, the horns arise as separate ossifications, and are covered by hairy skin.

The third family, the Camelidæ, are aberrant ruminants. They walk on broad integumentary cushions, developed below the phalanges of the third and fourth toes, which are alone developed, the nails not forming hoofs. Large pointed canines are present in each jaw. The stomach has a characteristic structure. The placenta is diffuse. There are only two existing groups—the Camels of the Old World, and the Llamas of the New.

See RUMINANTIA, BOVIDÆ, DEER; also FIG, HIPPOPOTAMUS; ALPACA, ANTELOPE, BUFFALO, CAMEL, GIRAFFE, LLAMA, OX, SHEEP, &c.

Artocarpaceæ, a natural order of Monoclamydeous dicotyledons, of which the Bread-fruit (*Artocarpus incisa*) is the most familiar example; it is usually extended to include the tribe of mulberries and figs (Moraceæ), and with them is often grouped as a sub-order of the great nettle family, Urticaceæ, but by Baillon under Ulmaceæ. The Artocarpaceæ proper are almost all tropical trees, and include many highly useful species, as well as some deleterious to man. The milky juice of some yields Caoutchouc (q.v.); and that of a few species is so bland as to be used as a substitute for milk (see COW-TREE). The juice of others is, however, very poisonous, as that of *Antiaris*

toxicaria, the poison usually called Upas by the Javanese. The fruits are wholesome; the importance of Bread-fruit in the South Sea Islands is well known; and the seeds of the Musanga of the Gold Coast of Africa, and of *Brosimum alicastrum* in the West Indies, are eaten as nuts. The fibrous bark of the Bread-fruit tree is made into cloth; its wood is used for building, its male catkins for tinder; its leaves serve as substitutes for table-cloths and wrapping-papers, and its milky juice for bird-lime. The bark of *Antiaris succidura* is used in Western India for making sacks, which are formed by cutting a branch of the dimensions of the sack wanted, and simply turning back and drawing off the bark after it has been soaked and beaten, the wood being sawn off so as to leave a little portion to form the bottom of the sack. The fibrous bark of *Cerrophia peltata*, or Trumpetwood, is used for cordage. The stem and branches are hollow, and are used for wind-instruments. The wood of some species is valuable, such as Letterwood (q.v.). The wood known as *fustic* is *Macleura tinctoria*, and *M. aurantiaca* (Osage Orange) also yields yellow stain. See BREAD-FRUIT, UPAS; also FIG, MULBERRY.

Artois, an old province in the north of France, bounded by Flanders and Picardy, and almost corresponding with the modern department of Pas-de-Calais. Its capital was Arras. Louis IX. in 1237 made Artois a county, and gave it to his brother Robert. Afterwards it passed into the hands of Flanders and Burgundy, but was ceded to France by treaties in 1659. Charles X., in his early life, and also after his abdication, was known by the title of Count d'Artois.

Arts. The term 'Arts,' or 'Liberal Arts,' as technically applied to certain studies, came into use during the middle ages, and on the establishment of universities, the term 'Faculty of Arts' denoted those who devoted themselves to Science and Philosophy, as distinguished from the faculty of Theology, and afterwards of Medicine and Law. The number of 'Arts' embraced in the full medieval course of learning was seven: Grammar, Logic, Rhetoric (constituting the *Trivium*), Music, Arithmetic, Geometry, and Rhetoric (the *Quadrivium*). The terms Master and Doctor were originally applied synonymously to any person engaged in teaching. In process of time, the one was restricted to the liberal arts; the other to Divinity, Law, and Medicine. See DEGREES, UNIVERSITY.

Art Unions. Art unions are associations having for their object the promotion of an interest in the fine arts, and a more liberal patronage of them by the public. Though the origin of these unions seems to belong to the French, it was the Germans who fostered and developed them into the important aids to art they have since become. The Art Union of Munich was formed in 1823, and within ten years of that date, nearly every town of any consequence in Germany had one. Many of the German associations also directed their attention to the formation and encouragement of permanent galleries of art and other kindred objects; that of Cologne greatly assisting in the completion of its celebrated cathedral.

The first union in Britain was established in Edinburgh in 1834, at which time the patronage of the fine arts had reached such a low ebb, that, excluding portraits, the amount expended in the purchase of pictures in the Scottish Academy's annual exhibition was sometimes as low as £35, and never more than £300. The success of the association was immediate, and to its founders the public are in no small degree indebted for the rapid progress which art has made in this country

during the last thirty years. It has otherwise followed the example of the German unions, inasmuch as nearly every year it purchases an important work of art, a picture or a statue, which is placed in the permanent National Gallery. Similar associations immediately followed in London and Dublin, and now almost every large town which has an annual art exhibition has also its art union. These associations are nearly all constituted alike, and consist of any number of individuals paying a certain sum, usually a guinea per annum, towards a fund, which, after deducting necessary expenses, is mainly devoted to the purchase of works of art for distribution as prizes to the subscribers.

The distribution is effected on the lottery principle, but a diversity of practice exists in the method of expending the funds. As this diversity has given rise to much controversy, it may be briefly explained. Firstly, the method common on the Continent, and adopted in Edinburgh, consists in putting, year by year, the whole sum to be devoted to the purchase of works of art, into the hands of a committee of gentlemen, who are chosen for their supposed taste in such matters, and requesting them to purchase pictures and other works of art for distribution by lot to the subscribers. Secondly, the plan followed by the London Art Union is to distribute the money itself by lot, and to insist on the prize-holders expending their prizes in pictures, selected by themselves, from certain exhibitions. If the object of the associations is to cultivate a taste for higher art than exists in the general community for the time being, then there is no doubt that the first method is the true one.

The weak point of art unions is the expense of management, which in some cases is a very high percentage of the total sum subscribed; and it may even be doubted whether, now that the patronage of art has grown to its present dimensions, they have not outlived their usefulness.

The difficulty of distinguishing between the lottery as part of the art union, and lotteries of an unquestionably illegal kind, led in 1846 to the passing of a special act for legalising *bona-fide* art unions, maintained solely for the encouragement of art. Unions, however, to be legal, must be incorporated by royal charter, or the instrument constituting the association and their rules be previously approved by the Privy-council. See EXHIBITIONS, LOTTERIES.

Artvin, a town of Russian Armenia, on the Charch, 34 miles S. of Batumi. Pop. 8000.

Arum. See ARRU.

Arum, a genus of spadiceifloral monocotyledons, belonging to the natural order Araceæ or Aroideæ. This order is chiefly tropical, and comprises herbaceous plants, some of which are stemless; shrubby plants, some of which are arborescent; and plants which climb by aerial roots, clinging to the trees of tropical forests. The leaves are sheathing at the base, convolute in bud, usually with branching veins. The small degenerate flowers are crowded upon the elongated axis or *spadix*, which is generally inclosed by a large bract or *Spathe* (q.v.), frequently coloured or white: the male flowers are aggregated at the upper part of the spadix, and the female flowers towards its base. In some species, a stench like that of carrion is produced during flowering, as well as a remarkable degree of heat. Plants are of course slightly warmer than the air around them, the heat being produced by the breaking up and oxidation of their protoplasm, and by the true respiration, in short, which goes on in all living tissues (see ANIMAL HEAT); but flowers,

in general, are only 1° or 1½° warmer than the air, whereas the flowers of some of the Arums and nearly allied plants are sensibly warm to the touch, and that of *A. cordifolium* has been found to have a heat of 121° F., when that of the air was only 66° F.—The only British species is *A. maculatum*, Cuckoo-pint or Wake-Robin, which is abundant in England, and in most parts of Europe, growing chiefly in moist shady woods and under hedges. It has a

tuberous perennial root; its leaves are all radical, on long stalks, strongly arrow-shaped, often spotted; the spathe greenish yellow, inclosing a rather short violet or brownish-red spadix. It produces scarlet berries, 1 2 seeded, about the size of peas, clustered upon the spadix. The root has a burning acrid taste, which, however, it loses in drying or boiling. In a fresh state, it is a drastic purgative, too violent for medicinal use; and, indeed, it, as well as the leaves, is an active poison; yet a nourishing farina is prepared from it, after the acrid juice has been removed. This farina is a pure starch, and is known in England by the name of Portland Sago or Portland Arrowroot. It was formerly prepared to a considerable extent in the Isle of Portland, where also the tubers (corms) themselves were eaten by the country people. They lose great part of their acidity in drying, and were formerly used in medicine as a stimulant in impaired digestion, a diuretic in dropsies, and an expectorant in chest complaints. The plant is cultivated in India for food.—*A. indicum* is also cultivated in Bengal for its esculent stems and small pendulous tubers.—Acridity in the juice, and the presence of an abundant and nutritive store of starch, from which the acrid juice is easily separated, are characteristics of many plants of this order, particularly species of *Caladium* and *Colocasia*, much used for food in warm countries, under the names Cocco (q.v.), Eddoes, &c.—*Anorophallus campanulatus* (*A. campanulatum*), called Ol by the Bengalese, is cultivated in some parts of India for its corms, which form a very important article of food; yet in a fresh state it is so acrid that it is employed as an external stimulant. The peculiar acridity of the order is most remarkably displayed in *Dieffenbachia*, the Dumb Cane (q.v.).—Two large species of *Arisema*, another genus very closely allied to Arum, were found by Dr Hooker to afford food to the inhabitants of the Sikkim Himalaya at an elevation of upwards of 10,000 feet. Their tuberous roots are bruised by means of wooden pestles, and thrown into small pits with water, until the commencement of acetous fermentation, when the acridity is mostly dissipated; but the process is so imperfect that cases of injury from the poisonous juice are frequent. The tubers of *Arisema atrorubens*, a native of the United States, and there known as Dragon-root and Indian Turnip, yield a pure white starch like that of *A. maculatum*.—The Dragon-plant, *A. Draconculis*, a native of the south of Europe, is sometimes seen in gardens in Britain, despite its carrion-like smell.—The so-called 'Lily of the Nile,' so commonly used as a decorative plant in this country on account of its white spathes and large leaves, is *Richardia* (*Calla*) *athiopica*.



Arum maculatum: A, flower-stalk within bract or spathe; B, flower-stalk without spathe.

Arundel, an ancient municipal borough (till 1867 also parliamentary) of Sussex, on the navigable Arun, 5 miles from its mouth, and 10 miles E. of Chichester. Arundel Castle, the seat of the Fitzalans, Earls of Arundel, from 1243 to 1580, and since then of the Howards (q.v.), comprises a circular Norman keep, 100 feet high, and a modern Gothic edifice dating from 1791. It has stood three great sieges, in 1102, in 1139, and in 1644. The cruciform parish church (1387) has its choir cut off from the nave by a brick wall. The Duke of Norfolk's proprietary claims over this choir, called the Fitzalan chapel, but really a collegiate church, were vainly contested in 1879-80. The splendid Roman Catholic church (1873) was erected by the Duke of Norfolk at a cost of £150,000. Pop. (1851) 2748; (1881) 2748. See Tierny's *Arundel* (1834), and Freeman's *English Towns* (1883).

Arundel, THOMAS, Archbishop of Canterbury, was born in 1353, the second son of Robert Fitzalan, Earl of Arundel. In his twenty-first year he was raised from the archdeaconry of Taunton to the see of Ely; in 1388 he was translated to the archbishopric of York, and in 1396 to that of Canterbury. Banished by Richard II. (1397), he helped to seat Henry of Lancaster on the throne (1399); but

chiefly remembered as a bitter opponent of the Lollards, two of whom were burned by him in 1401 and 1410. He died 19th February 1413.

Arundel Marbles, part of a collection of ancient sculptures, purchased in 1624 at Smyrna and elsewhere by Thomas Howard, Earl of Arundel (1586-1646), and presented in 1667 to the university of Oxford by his grandson, Henry Howard, afterwards Duke of Norfolk. Its gem is the 'Parian Chronicle,' consisting of fragments of a marble inscription, supposed to have been executed in the island of Paros about 263 B.C. In its perfect state this inscription contained a chronological table of the principal events in Grecian history from 1582 to 264 B.C. The chronicle of the last ninety years is lost, and the extant portion of the inscription is much corroded and defaced. The 'Arundel Society,' established in 1848, for promoting the knowledge of art, commemorates the name of the Earl of Arundel, one of the earliest lovers of art in England.

Arundo. See REED.

Aruwimi is the name of an important tributary of the Congo, entering the latter from the north in 1° 10' N. lat., 23° 30' E. long. It was explored for 100 miles by Stanley in 1883, and by it Stanley advanced to the relief of Emin Pasha in 1887. For a time it was maintained by some that the Aruwimi was the lower course of Schweinfurth's Welle, now believed to enter the Congo by the Mobangi far to the west. See CONGO, AFRICA.

Arvad (Gr. *Arados*), an ancient city of Phœnicia, occupying a small island barely a mile in circumference, 2 miles from the coast, near the mouth of the river Eleutherus. It is said to have been founded by the Sidonians, and was famed for the seafaring skill of its inhabitants.

Arval Brethren (*Fratres Arvales*), a college of twelve priests in ancient Rome, who yearly made offerings to the field Lares for the increase of the fruits of the field. Its institution was ascribed to Romulus, from which we may at least argue its extreme antiquity. Niebuhr suggested that it was originally connected with the Latin element of the Roman state, just as its sister college, that of the *Sodales Titii*, was confessedly instituted for the purpose of keeping up the specially Sabine religious rites. The office was held for life—its badge was a chaplet of ears of corn worn on the head with a white band. One account of the ceremonies at

their principal festival, that of three days in honour of Dea Dia, supposed to be Ceres, is preserved in an inscription written in the first year of the Emperor Elagabalus (218 A.D.). The same inscription contains a hymn, which appears to have been sung at the festival from the earliest times. Later inscriptions show that the college was still in existence about the middle of the fourth century.

Arve, a mountain stream rising in the Col de Balme, one of the Savoyan Alps, and flowing through the Vale of Chamouni into the canton of Geneva, below which town it joins the Rhone, after a course of 62 miles.

Arveyron, a small tributary of the Arve, in Savoy, is the outlet of the famous *Mer de Glace*, in the valley of Chamouni, from which it issues in a torrent through a beautiful grotto of ice, from 40 to 150 feet in height, known as the 'Ice-gates of the Arveyron.' Its course is short, and it joins the Arve on its right bank, some distance above Chamouni.

Arvicola. See VOLE.

Aryan Race and Languages. The name Aryan (less properly, Arian) has, since about 1845, been used to designate the ethnological division of mankind otherwise called Indo-European or Indo-Germanic. That division consists of two branches, geographically separated, an eastern and a western. The western branch comprehends the inhabitants of Europe, with the exception of the Turks, the Magyars of Hungary, the Basques of the Pyrenees, and the Finns of Lapland; the eastern comprehends the inhabitants of Armenia, of Persia, of Afghanistan, and of Northern Hindustan. The evidence on which a family relation has been established among these nations is that of language. Between Sanskrit (the mother of the modern Hindu dialects of Hindustan), Zend (the language of the ancient Persians), Greek (which is yet the language of Greece), Latin (the language of the Romans, and the mother of the modern Romanic languages—i.e. Italian, French, Spanish, Portuguese, Rumanian), Celtic (once the language of great part of Europe, now confined to Wales and parts of France, Ireland, and Scotland), Gothic (which may be taken as the ancient type of the Teutonic or Germanic languages—including English and of the Scandinavian), and Slavonic (spoken in a variety of dialects all over European Russia and a great part of Austria), the researches of philology have within the 19th century established such affinities as can be accounted for only by supposing that the nations who originally spoke them had a common origin. No one of these nations, existing or historical, can claim to be the parent nation of which the others were colonies. The relation among the languages mentioned is that of sisters—daughters of one mother, which perished, as it were, in giving them birth. No monuments of this mother-language have been preserved, nor have we any history or even tradition of the nation that spoke it. That such a people existed and spoke such a tongue is an inference of comparative philology, the process of reasoning being analogous to that followed in the kindred science of geology. The geologist, interpreting the inscriptions written by the finger of Nature herself upon the rock-tablets of the earth's strata, carries us back myriads of ages before man appeared on the scene at all, and enables us to be present, as it were, at creation itself, and see one formation laid above another, and one plant or animal succeed another. Now languages are to the ethnologist what strata are in geology; dead languages have been well called his fossils and petrifications. By skilful interpretation of their indications, aided by the light of all other avail-

able monuments, he is able to spell out, with more or less probability, the ethnical records of the past, and thus obtain a glimpse here and there into the gray cloud that rests over the dawn of the ages.

When these linguistic monuments are consulted as to the primitive seat of the Aryan nations, they point to Central Asia, somewhere probably east of the Caspian, and north of the Hindu Kush and Paropamisus Mountains. There, at a period long anterior to all European history—while Europe was perhaps only a jungle, or, if inhabited at all, inhabited by tribes akin to the Finns, or perhaps to the American Indians—dwelt that mother-nation of which we have spoken. From this centre, in obedience to a law of movement which has continued to act through all history, successive migrations took place towards the north-west. The first swarm formed the Celts, who seem at one time to have occupied a great part of Europe; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic peoples. All these would seem to have made their way to their new settlements through Persia and Asia Minor, crossing into Europe by the Hellespont, and partly, perhaps, between the Caspian and the Black Sea. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Caspian. At a period subsequent to the last north-western migration, the remnant of the primitive stock would seem to have broken up: part poured southwards through the passes of the Himalaya and Hindu Kush into the Punjab, and became the dominant race in the valley of the Ganges; while the rest settled in Persia, and became the Medes and Persians of history.

It is from these eastern members that the whole family takes its name. In the most ancient Sanskrit writings (the Veda), the Hindus style themselves Aryas; and the name may be preserved in the classic Arii, a tribe of ancient Persia, and in the district Ariana. Aryan is evidently an old Persian word, preserved in the modern native name of Persia, Airan or Iran. *Arya*, in Sanskrit signifies 'excellent,' 'honourable,' originally, 'lord of the soil,' from a root *ar* (Lat. *arare*, 'to plough'), distinguishing tillers (*carers*) of the earth from the nomadic Turanians. French savans limit the word *Arya* to the eastern section of the Indo-European stock.

Max Müller has drawn a picture of the Aryan family while yet one and undivided, in which the state of thought, language, religion, and civilisation is exhibited in a multitude of details. Where the same name for an object or notion is found used by the widely spread members of the family, it is justly inferred that that object or notion must have been familiar to them while yet resident together in the paternal home. It is in this way established, that among the primitive Aryans not only were the natural and primary family relations of father, mother, son, daughter, hallowed, but even the more conventional affinities of father-in-law, mother-in-law, sister-in-law; that to the organised family life there was superadded a state organisation with rulers or kings; that the ox and the cow constituted the chief riches and means of subsistence; and that houses and towns were built.

One general observation made by Max Müller is so interesting that we quote it entire. 'It should be observed,' he says, 'that most of the terms connected with chase and warfare differ in each of the Aryan dialects, while words connected with more peaceful occupations belong generally to the common heirloom of the Aryan language. The proper appreciation of this fact in its general bearing will show how a similar remark made by Niebuhr, with regard to Greek and Latin, requires a very different explanation

from that which that great scholar, from his more restricted point of view, was able to give it. It will show that all the Aryan nations had led a long life of peace before they separated, and that their language acquired individuality and nationality as each colony started in search of new homes—new generations forming new terms connected with the warlike and adventurous life of their onward migrations. Hence it is that not only Greek and Latin, but all Aryan languages, have their peaceful words in common; and hence it is that they all differ so strangely in their warlike expressions. Thus the domestic animals are generally known by the same name in England and in India, while the wild beasts have different names, even in Greek and Latin.'

In this mainly pastoral life, the more important of the primitive arts were known and exercised: fields were tilled; grain was raised and ground into meal; food was cooked and baked; cloth was woven and sewed into garments; and the use of the metals, even of iron, was known. The numbers as far as a hundred had been named, the decimal principle being followed. The name for a thousand had not come into requisition until after the dispersion, for it differs in the different Aryan tongues.

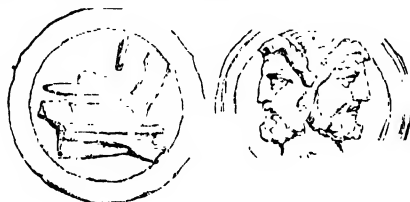
The Aryan religion consisted in a worship of natural objects and phenomena, more especially of the sun and dawn, and other bright powers of day; but it was *henotheistic* rather than polytheistic, as out of the many gods he believed in, the worshipper prayed to one only at a time. The gods ruled the world, dwelling like a human family with the *dyauspitar* (*Diespiter*) at their head. This 'father of heaven' was the 'bright' sun, the stars and moon were his sons and daughters. Fragments of the hymns addressed to the gods, framed while abstract language did not yet exist, and every word was a metaphor, originated those stories of gods, heroes, and monsters, which, with more or less of variety, but still with a family likeness, formed the primitive mythology of every member of the group. Curious parallels, however, between Aryan mythology and that of savage races not ethnologically connected with the Aryan have been pointed out by Lang and others, and have given rise to discussion whether these are due to transmission, or merely to the essential identity in the working of the human mind at equal levels of culture.

It should be mentioned that Latham's theory of the European origin of the Aryans was supported by Spiegel and Benfey, and still finds assertors. See Pöschke, *Die Arier* (1878); Penka, *Origines Arianice* (1883); *Herkunft der Arier* (1886); and O. Schrader, *Sprachvergleichung und Urgeschichte* (1883). Some of the European languages would in that case offer a truer representation of the original Aryan tongue than the Indic ones. The original home of the Aryan would be Scandinavia, or the neighbourhood of the Baltic; and the Aryan himself, a coarse nomad, without metals, clothed in skins. Pöschke assumes that the Aryan languages were the product of the white race, whose colour was due to the albinism caused by a long residence in the marshy country between the Niemen and the Dnieper. But as Sayce points out, the weight of evidence from comparative philology is against other than an Asiatic cradle for the Aryan tongue. The parent-speech need not necessarily have been one undivided uniform tongue, but may already have been split up into dialects, like the provincial Latin that developed into the Romanic languages of modern Europe. Humboldt believed that the Sea of Aral is the remains of a great inland lake which once included the Caspian and the Euxine—a theory confirmed by recent researches. According to Sayce, it was this

inland sea, with the desert that lay to the south of it, which cut the Aryans off from communication with the civilised races of Elam and Babylonia, and forced the first emigrants to the west to push their way through the steppes of Tartary and the pass of the Ural range.

See Sayce's *Introduction to the Science of Language* (2d ed. 2 vols. 1883); also the articles ETHNOLOGY, PHILOLOGY, MYTHOLOGY.

As was the designation both of a Roman weight (called also *libra*) corresponding very nearly to an English pound, and also of a coin made of the mixed metal *aes*, or bronze. The weight was divided into 12 parts; the *uncia* = $\frac{1}{12}$, the *quadrans* = $\frac{1}{4}$, the *sestertius* = $\frac{1}{2}$ as, &c. The as (coin) originally no doubt weighed a (Roman) pound, of the value of ϵ out 8 $\frac{1}{2}$ l., and was uncoined until Servius Tullius stamped it with the figures of animals, hence the Latin *pecunia*, 'money,' from *perus*, 'cattle.' Pliny tells us that in the first Punic war,



As.

on account of the scarcity of money, the as was reduced to two ounces, a sixth of its ancient weight, and that thus the republic paid off its debts, gaining five parts in six; that afterwards, in the second Punic war, during the dictatorship of Q. Fabius Maximus, it was again reduced one half, to one ounce, and the *denarius* was decreed equal to sixteen ases, the republic thus gaining one-half; and that soon after, by the Papirian law (191 B.C.), ases of half an ounce were made. When the denarius was equal to ten ases, the value of the as was a little more than three-farthings; when sixteen ases went to the denarius, its value was about a halfpenny. It was by the silver coin, the *sestertius* (q.v.), that money was reckoned at Rome. It was originally equivalent to $2\frac{1}{2}$ ases, or one-fourth of a denarius.

Asa, son of Abijah, and third king of Judah (935-916 B.C.), strove zealously for the purity of religion, and to strengthen the defences of his kingdom. He repelled with immense slaughter an Egyptian invasion, and waged successful war against Baasha, king of Israel, with the aid of the Syrian monarch, Benhadad.

Asa Dulcis (i.e. Sweet Asa), a synonym of Benzoin (q.v.). This name was applied to the gum-resin when it began to be imported into Europe in the early part of the 16th century.

Asafœ'tida, or ASSAFETIDA (i.e. Fetid Asa or Asa), is a gum-resin, which has been supposed to be identical with the exuded juice of the *Silphium* of Dioscorides, so highly esteemed among the Greek physicians. Its name is derived from the Persian word *asā*, 'mastic.' The drug is procured by drying the milky juice which flows from the root of the plant *Ferula* (*Narthex*) *asafetida*. The root of the asafetida plant is long, and generally undivided; white inside, but having a black overing; and contains in its interior a quantity of juice of an overpowering odour, which much resembles that of garlic. *Ferula* or *Narthex asafetida* has its radical leaves tripartite, their segments bipinnatifid, and nearly two feet in length.

Asafetida is prepared in the dry southern provinces of Persia, but chiefly in Khorassan and

Afghanistan, and also to the north of the Hindu Kush range of mountains. About April, the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it.

After a lapse of six weeks, a slice is cut horizontally from its summit, this operation being repeated at intervals of a few days till the root is exhausted, and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. Asafetida is used in medicine, and possesses stimulant and antispasmodic properties. When taken internally, it undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. According to the analysis of Pelletier, asafetida is composed of the following substances: resin, 65 parts; volatile oil, 3.6; gum, 19.44; bassorin, 11.66; various salts, .30. In many parts of the East, this drug is used as a condiment, in which respect it seems to take the place of the garlic of some European nations.

Asaphus. See TRILOBITE.

Asar is the Swedish name given to long wind-ing banks and ridges of gravel and sand, which occur abundantly in the low grounds of Sweden. They often run continuously for more than 100 miles sometimes one dominant ridge being joined by many tributary ridges, just as a river by its affluents. They are believed to have been formed underneath the great *mer de glace* which covered Sweden during the Glacial Period (q.v.), and to mark the site of sub-glacial streams and rivers. Similar gravelly ridges occur in Ireland, where they are called *esker*, and in Scotland, where they are called *kames*—a name which has been applied to similar gravelly accumulations which occur over vast regions in the northern states of the American union.

Asarabac'ea

(*Asarum europæum*), a plant of the natural order Aristolochiaceæ (see ARISTOLOCHIA), a native of Europe, growing in woods; but rare in Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic, and were formerly considerably used in medicine, especially in the preparation of snuffs used in the treatment of catarrh, &c.—A nearly allied species, *A. canadense*, a native of Canada, is stimulant and



Ferula asafetida.

Asarabacca
(*Asarum europæum*).

diaphoretic, and is used, under the name of Canada Snakeroot, instead of *Aristolochia serpentaria*. It is also called Wild Ginger, and used as a spice, being of a warm aromatic quality, and not acrid, like its European congener.

Asben. See AIR.

Asbes'tos, a mineral very closely allied to tremolite, actinolite, and hornblende, and which, along with tremolite and actinolite, is often ranked among the varieties of hornblende. It consists chiefly of silica, magnesia, lime, and oxide of iron, and is of a fine fibrous character, the fibres sometimes combined together in a compact mass, sometimes easily separable, elastic and flexible. It is generally of a whitish or greenish colour, and has a silky or vitreous lustre. The variety called *Rock-cork* very much resembles cork, is soft and easily cut, and so light as to swim in water. *Rock-leather* and *Rock-wood* are varieties somewhat similar to rock-cork, but not so light. The finest fibrous variety with easily separable fibres is called *Amianthus* (from a Greek word signifying 'unpolluted,' as Asbestos is from a Greek word signifying 'indestructible'), because cloth made of it was cleansed by passing it through fire. This cloth was used by the ancients to enwrap dead bodies placed on the funeral pile, so as to preserve the ashes of the body unmixed. The finest amianthus is found in the Tarentaise in Savoy. It is abundant in Corsica, and is found also in Cornwall, at Portsoy in Scotland, and in several of the Shetland Islands. The main supply came, till of late, from the older crystalline rocks of the Alps and Pyrenees, from North America and Silesia, but is now obtained mostly from Italy and Canada, Tasmania, and New South Wales. Asbestos is now applied to many and very various purposes. It is largely employed in the form of cloth or canvas as a filtering medium for corrosive liquids, while as millboard or earboard it has an extensive application in the form of washers for fire or acid proof joints. Steam stopcocks are now constructed in which the key or plug works in a chamber closely packed with fibrous asbestos; while for all kinds of engine joints, boiler man-holes, and similar situations, the imperishable nature of asbestos renders it specially valuable. It has recently come into extensive use in the construction of gas fires. At first the coarser varieties only were used, being ground to powder, and then made into balls of a reddish-brown colour by means of fireclay. These being heated by some form of Bunsen-burner (q.v.), became red-hot, and radiated out a large proportion of heat. Later inventors, however, tend to use the filamentous white variety, in combination with a network of iron, for the purpose of producing a more cheery fire, the thin fibres being readily raised to a white heat. In the form of paint (made with asbestos powder, the medium being a secret) it has been much used to render wooden buildings more or less fully fireproof; but the tendency of the paint to peel off the wood has hitherto detracted from its value. Wood treated in this way does not burst into flame, but only smoulders away under the influence of heat. As a non-conductor of heat, asbestos has valuable properties; a sheet of it placed on a table enabling red hot vessels to be put down without danger. It is used for so many and various purposes as packing for all classes of machinery, fire-escapes, firemen's clothing, furna oven's gloves, fire-proof putty, sheeting, boiler and steam-pipe covering, millboard for every purpose, paper, cloth for filtering acids and other similar uses; for covering rollers in print-works (where aniline dyes are employed, and it is necessary to resist heat and the action of the acids); for

flooring-felt, roofing-felt, and wall-felt, more especially in timber-built houses; as a lubricant for every kind of engine; for portable fireproof safes, and for lamp-shades; for curtains in theatres; as a non-conductor in electrical work, as tubing for covering telegraph wires, and for electricians' gloves. Asbestos paper, printed with a pattern, has been used to cover wooden partitions. In its manufacture the lumps of crude asbestos are put through an ingenious crushing-machine, whose rollers have a parallel motion in addition to their rolling action over each other. This action effectually opens out the fibres, which are then boiled in large tanks. The shorter fibres having been ground down and reduced to a pulp, are converted into asbestos millboard by manipulation on gauze netting. The longer fibres on leaving the crushing-machine are woven into yarn and cloth in looms.

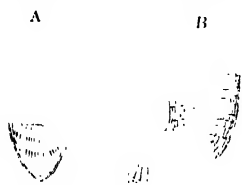
Asbjörnsen. PETER CHRISTIAN, one of the most popular among Norwegian authors, was born 15th January 1812 at Christiania. He studied at the university in his native city, then found in the leisure of a four years' residence as a tutor in the country the opportunity to learn thoroughly the life of the common people. In long journeys on foot he collected a rich store of popular poetry and folklore. On his return to the capital he devoted himself to the study of medicine and the natural sciences, and from 1846 to 1853 he explored and dredged, at government expense, various parts of the Norwegian coast, without neglecting the while any opportunity of prosecuting his favourite study. In the years 1849-50 he accompanied a Norwegian ship of war to the Mediterranean, and from 1856 to 1858 he studied forestry at Tharandt in Saxony. Appointed inspector of forests for the Trondhjem district in 1860, he was sent by government in 1864 to investigate the manufacture of peat in Holland, Germany, and Denmark. On his return he was appointed to take measures for its better manufacture among the peasantry, and he resigned this office only in 1876. He died at Christiania, 6th January 1885. Asbjörnsen lived a busy and useful life, and wrote many scientific and practical books on such subjects as natural history, forestry, peat-manufacture, marine fauna, and sensible cookery; but it is not by these, but by his inimitable collections of folk tales, that his name will be remembered. He first opened the eyes of his countrymen to the rich treasures of poetry and quaint folklore that were to be found among simple and honest country-people; and it is hardly too much to say that to his collections is directly due the growth of the national element in Norwegian literature which has since become predominant in the literature, art, and music of the country. He was fortunate in finding for his first collection a coadjutor with almost as fine poetic sympathy as himself, Jorgen Moe, afterwards Bishop of Christiansand, and one of the most considerable poets of his time. The two friends published in 1842 the first series of *Norske Folkelæstentyr* ('Norwegian Folk and Fairy Tales'), in the vernacular of the country. Asbjörnsen alone published in 1845 the first series of his *Norske Huldreentyr og Folkesagn*, consisting of stories about the *Huldre*, or fairy of the Norwegian woods, with bright descriptions of the natural scenery and of the characteristic life of the peasantry. Three years later (1848) appeared a second collection; and in 1871 he published also a second volume of the *Folkelæstentyr*. These books are now classics in their native literature, and have a place on the shelves of folklorists in all countries. They have been translated into most European languages; into English by Sir George W. Dasent in *Popular Tales from the Norse* (1859), and *Tales from the*

Fjeld (1874); and by H. L. Brækstad in *Round the Yule Log* (1881).

Asbury, FRANCIS, the first Methodist bishop consecrated in America, was born at Handsworth in Staffordshire, August 20, 1745. When sixteen years old he became an itinerant Wesleyan preacher, and in 1771 he was sent as a missionary to America, where he was consecrated in 1784. During a long life of almost incessant labour, it is estimated by his biographer that he travelled about 270,000 miles (mostly on horseback), preached about 16,500 sermons, and ordained more than 4000 preachers. Of great natural ability and indomitable energy, he ranks with Wesley, Whitefield, and Coke in the Methodist movement of his time. He died at Richmond, Virginia, March 31, 1816.

Ascalon, or ASHKELON, one of the five chief cities of the ancient Philistines, lying north of Gaza, on the Mediterranean. It was strongly fortified, had a shrine of the Syrian fish-goddess Derketo, and was the birthplace of Herod the Great. In Solomon's time it was tributary to the Jews; later it became independent, and its kings often kindled the wrath of the prophets. Under the Romans it was a kind of republic, and afterwards the seat of a Christian bishop. The Arabs took it in 637. Before its walls in 1099 the Crusaders, under Godfrey de Bouillon, gained a decisive victory. Recaptured by the Moslems, it was retaken, after a five months' siege, in 1157, by Baldwin III. It was dismantled by Saladin in 1191, and completely demolished in 1270 by Sultan Bibars. The name of this ancient city is preserved in the *Eschavot* or *Shallot*, a favourite kind of onion, first grown in the fertile plains around.

Ascaris, a genus of parasitic worms in the Nematode or Thread-worm (q.v.) order. *Ascaris lumbricoides* is one of the four thread-worms not infrequently infesting man, and especially children. It occurs in the intestine, whence it occasionally works its way into other parts of the body. The thin cylindrical body measures from 6 to 10 inches in



A, posterior end of female
B, posterior end of male

length, is of a whitish or light-yellow colour, and is pointed at both ends. The surface of the transparent skin is somewhat wrinkled, but there are no internal segments. The sexes are separate, and the less frequent males are distinguished by their turned-up posterior extremity, and the presence of two copulatory spicules. The skin is strong and protective, and forms three lips round the mouth. The muscular system is well developed, and the name *Ascaris* (Gr. *askarizo*, 'to jump') probably refers to the lively motions of some forms. The eggs develop in water or damp earth, and it seems probable that the embryos are directly swallowed by man. This troublesome though rarely dangerous parasite is best dealt with by means of expulsive purgatives. Care as to the purity of drinking-water, and thorough cleaning of vegetables eaten raw, are evident preventive precautions. See PARASITISM, ROUND-WORMS, THREAD-WORMS.

Ascension, a solitary island nearly in the middle of the South Atlantic, 685 miles NW. of St Helena, in 7° 57' S. lat., and 14° 21' W. long. It is said to have received its name from having been discovered by a Portuguese navigator on Ascension-day, 1501. It is 7½ miles long by 6 broad, its area being 35 sq. m. First occupied by the English in 1815, in connection

with Napoleon's detention on St Helena, it is now used only as a sanatorium, having ceased since 1887 to be a coaling depôt. Like St Helena, it is of volcanic origin, being one of the peaks of a submarine ridge which separates the north and south basins of the Atlantic. It rises in the Green Mountain to a height of 2870 feet. The water-supply is drawn from this mountain at a great height above sea-level. The climate is dry and healthy. Vigorous attempts have been made in recent years to bring the land under cultivation. Young trees, shrubs, furze, grasses, and hardy plants have been planted with success; and now the grasses fatten a large number of sheep and cattle. European vegetables are grown, besides the indigenous tomato, castor-oil plant, and pepper. Thus this barren rock has been made capable of supporting a considerable population. Turtles are very abundant. Several astronomers and savans have visited Ascension, from Halley in 1677, to Darwin, Sir Wyville Thomson, and Mr Gill in the 19th century. Pop. (1871) 27; (1886) about 500, chiefly officers, seamen, marines, and Kroomen. See Mrs Gill's *Six Months in Ascension* (1879).

Ascension, RIGHT, the name given in astronomy to one of the arcs which determine the position relatively to the equator of a heavenly body on the celestial sphere, the other being the declination (see ARMLINARY SPHERE). It meant originally the difference of time of rising of the first point of Aries (q.v.) and the heavenly body referred to, on a right sphere. Hence it is called *Right Ascension*. The sphere of the heavens would be *right* if the poles were on the horizon, as is the case at the earth's equator. At all other places, the axis of the celestial sphere is *oblique*—i.e. inclined to the horizon—so that the right ascension of a star gives no *direct* knowledge of its rising time except there. The term right ascension has thus passed into general use as meaning simply the arc of the equator intercepted between the first point of Aries, and the point at which the circle of declination passing through the star cuts the equator. Measured always from west to east, right ascension on the heavens corresponds to longitude on the earth. The right ascension of a heavenly body is ascertained by means of the transit instrument and clock. The transit instrument determines its meridian passage, and the transit clock gives the time at which this takes place. When the first point of Aries is in the meridian, the clock stands at 0 hours, 0 minutes, 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock, therefore, at the passage of any heavenly body gives its right ascension in time, and this, when multiplied by 15, gives the same in degrees, minutes, and seconds. The right ascension is usually given, however, in time. The old term, *oblique* ascension, was given to the right ascension of the point of the equator that rose simultaneously with the heavenly body; and the difference of the oblique and right ascension was called the 'ascensional difference.'

Ascension-day, or HOLY THURSDAY, one of the great festivals of the church, held on the fortieth day after Easter, to commemorate the ascension of Christ into heaven. Its institution dates from the 4th century. The Church of England appoints special psalms for it, and particularly recommends it as a fitting day for the receiving of the communion. Connected with the religious observances of the day were certain civic ones, which in some parts of England and Scotland are continued to this day—viz. *beating the bounds*, or *riding the marches*, though their

religious connection is apparently forgotten. See ROGATION DAYS, and BOUNDS (BEATING THE).

Asceticism. Among the Greeks, *askēsis* denoted the training gone through by athletes or wrestlers, who had to harden their bodies by exertion and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions; and in this sense it passed into the language of the early Christians. But to understand the vast influence that ascetic ideas have exercised on the Christian religion, we must look beyond the bounds of its history. Their root lies in the oriental notion of the antagonism between mind and matter. The glowing imagination of the oriental carries the practice of asceticism to a monstrous extravagance, as is seen in the frightful self-tortures inflicted by the yogins (see YOGA) and fakirs (see FAKIR), the suicides in the sacred Ganges and otherwise, and the practices formerly prevalent of offering children in sacrifice, and of burning widows (see SUTTEE). Buddhism, which may be considered as a kind of Puritan reformation of the Indian religion, carried the principle beyond its previous bounds. In its condemning the world, in its inculcating a life of solitude and beggary, mortification of the body, and abstinence from all uncleanness and from all exciting drinks, the object was to keep as distant and detached as possible from this 'Vale of Sorrow' (see BUDDHISM, and NIRVANA). The ancient Egyptians sought to confine it to monogamy of the priests, rigid purity, moderate flagellation, and frequent contemplation of death.

It is in this light that we must consider Jewish and Christian asceticism. In the oriental mind, especially in Egypt, circumcision, avoiding of all uncleanness, and fasting, were signs of humiliation before God. Among the Jews, voluntary vows of abstinence, even from lawful food or wine, were practised by prophets and men of special calling, and in certain critical circumstances; but self-castigation continued for long foreign to the sobriety of Judaism, and even hermitism came into established practice only shortly before Christ, in Palestine among the Essenes (q.v.), in Egypt among the Therapeutæ (q.v.).

Asceticism was far less congenial to the reflective nations of the West, above all to the cheerful Greeks. A Greek felt himself as well entitled to enjoyment as his gods; hence Greek religious festivals were pervaded by cheerfulness. The only exception appears to be the Eleusinian mysteries, which never took hold of the people generally, and the passing phenomenon of the Pythagorean fraternity. The attack made by the Socratic school upon the body as the prison of the soul, and the extravagant contempt for the elegances, and even decencies of life, professed by the later Stoics and Cynics, were no genuine fruits of the popular Greek mind; and we must also ascribe to the infusion of oriental philosophy the ascetic tendencies of Neoplatonism, in holding abstinence from flesh and from marriage as chief conditions of absorption into the divinity.

It was into the midst of these ideas that Christianity was introduced. The Jewish converts brought with them their convictions about fasting. Fasting and Nazarite observances were thought sanctifying preparatives for great undertakings; and the inculcation of abstinence from marriage, on the ground of the expected speedy reappearance of Christ, tails in with the same notion—namely, that the flesh, i.e. the sensuous part of our nature, is the seat of sin, and must therefore, before all things, be rigorously chastened. The spirituality of Christianity, pointing away from

earth to heaven, and opposition to the corruption of the heathen world, combined to make the Christians of the 2d and 3d centuries hold aloof from the world and its wisdom, and favour abstinence from marriage, more especially on the part of the clergy. This ascetic spirit began as early as the commencement of the 2d century to court trial in the perilous practice of men and women living together under vows of continence. But during the first three centuries no irrevocable vows yet bound the devotees to a life-long asceticism. Fasting was also comparatively rare.

But the tendency to outward manifestations now began to grow stronger. The inward and spiritual life of the Christians had greatly declined; and if the previous bloody persecutions had driven individuals from human society into the deserts, the growing secularisation of the church, after Christianity became the state religion, had the same effect to a still greater degree. All this paved the way for the chief manifestation of asceticism—namely, monasticism, which the church found herself compelled by the overwhelming tide of opinion within and without to recognise, and to take under her protection and care. From the African Church, represented by Tertullian and Augustine, a spirit of gloomy and crushing supernaturalism spread deeper and deeper over the Western Church generally, intensifying the ascetic tendencies, and leading to still more marked separation from a despised world. There were not wanting healthier minds—as Jovinian and Vigilantius—to raise their voices against fasting and the outward works of asceticism generally; but such protests were vain, and became ever rarer.

From the 11th century, the Cathari, Waldenses, and other sects, though ascetics themselves in a way, yet assailed the external asceticism of the church; and so did Wyclif, Huss, and Jerome of Prague, in their premature struggles at reformation. After a preliminary skirmish by Erasmus, the struggle was decided for a great part of Christendom in the reformation of the 16th century; though the Catholic Church and a section of the Anglican Church still set a high value on various ascetic conditions and exercises—a celibate clergy, the monastic life, fasting and penance. Even the disuse of some of the simple comforts of life, such as the disregard of personal cleanliness, has been regarded as a work of holiness. The fundamental principle that salvation is secured by justification through faith, and not through dead works, struck at the root of monasticism and self-mortification in general. Yet the ascetic spirit often shows itself still alive under various disguises even in Protestantism. The extreme forms of Sabbatarianism have a distinctly ascetic colouring; and hostility to dancing, the theatre, card-playing, and other worldly pleasures (if these are not actually regarded as sinful), may be the outcome of ascetic tendencies. The Mennonites inculcated a rigid asceticism; and with the Shakers (q.v.) of America celibacy is insisted on as a virtue. The essence of asceticism is to hold self-denial and suffering to be meritorious in the sight of God, in and for itself. Many traits presented by Puritanism, Methodism, and Quakerism appear ascetic. It is not impossible that vegetarianism, total abstinence, and other recent austerities, though advocated on other grounds, recommend themselves to the feelings of many from their falling in with this deep-seated propensity to asceticism.

Even in the Catholic Church, ascetic practices have been modified in recent times; fastings are less rigorous, and the self-sacrifice of conventual life is more directed to beneficial ends. Mohanimedanism (q.v.) has undergone the same change, but Sufism (q.v.) is carried to the greatest excess

in Persia. In the Greek Church, monasticism had always a milder form. See the articles CELIBACY, FASTING, HERMIT, LENT, MONASTICISM, PENANCE, PILGRIMAGE, PILLAR SAINTS.

Asch, a town of Bohemia, 14 miles NW. of Eger. It has thriving silk, cotton, and woollen manufactures, especially of stockings. Pop. (1880) 13,209, chiefly Protestants.

Aschaffenburg, a Bavarian town of Lower Franconia, on the right bank of the Main, at the Aschaff's influx, 25 miles SE. of Frankfurt. The castle of Johannsburg, a Renaissance pile of 1605-14, overlooks the whole town. The Romanesque Stiftskirche was restored in 1870-81, and there is a reproduction of a Pompeian villa, built for Louis I. in 1842-49. Paper is the staple manufacture. Pop. (1885) 12,611, principally Catholics. The Romans built a fortress at Aschaffenburg; and here in 976 Otto I., Duke of Swabia and Bavaria, founded the collegiate church (*Stiftskirche*), which after his death came into the possession of the Archbishops of Mainz, and remained with them until the dissolution of the Germanic empire. In 1814, along with the principality of which it was the capital, Aschaffenburg was ceded to Bavaria by Austria. Near it the Prussians defeated the Austrians, July 14, 1866.

Ascham, ROGER, a distinguished English writer and classical scholar, was born in 1515 at Kirby Wiske, near Thirsk, in Yorkshire. He received his early education in the family of Sir Anthony Wingfield, and by him was sent, in 1530, to St John's College, Cambridge, where, in 1534, he took his B.A., and, in spite of his avowed leaning to the Reformed doctrines, obtained a fellowship. The study of the classics, especially Greek, had recently been revived at Cambridge, and Ascham's bent impelled him with ardour to these studies. His reputation as a classical scholar soon brought him numerous pupils; and about 1538 he was appointed Greek reader at St John's. He at first opposed the then new method of pronunciation which is still used in England; but afterwards adopted and defended it. His leisure hours were devoted to music, penmanship (in which he excelled), and archery. In defence of the latter art, he published, in 1545, a treatise entitled *Trochophilus*, the pure English style of which, independently of its other merits, ranks it among English classics. For this treatise, which was dedicated to Henry VIII., he was rewarded with a pension of £10, equivalent to about £100 of our present money. In 1546 he was appointed university orator. In 1548, on the death of his former pupil, Grindal, he was called to supply his place at Cheshunt as tutor to the Lady Elizabeth. In this office he gave the highest satisfaction; but at the end of two years abruptly resigned it, on account of a quarrel with the princess's steward. As secretary to Sir Richard Morysin, ambassador to the court of Charles V., he spent three years (1550-53) on the Continent, at Augsburg chiefly, but with occasional visits to Venice, the Tyrol, Carinthia; and in 1553 was published his *Report on the Affairs of Germany*. During his absence, he had been appointed Latin secretary to Edward VI.; and on his return, after the young king's death, the interest of Bishop Gardiner secured him the same office under Mary, his pension being at the same time doubled. His prudence and moderation preserved him from offending by his Protestantism; and after Mary's death, Elizabeth retained him at court in the double capacity of secretary and tutor, which offices he held till his death, 30th December 1568. His principal work, *The Scholemaster*, a treatise on classical education, was published in 1570 by his widow, and has been well edited by

Professor Mayor (1863). His admirable Latin and English letters, 295 in number, are included in Dr Giles's excellent edition of his English works (3 vols. 1864-65). See also Dr Katterfeld's *Roger Ascham, sein Leben und seine Werke* (1879).

Aschersleben, a town of Prussian Saxony, on the river Eine, 32 miles SW. of Magdeburg. Pop. (1871) 16,734; (1885) 21,528, occupied in agriculture, gardening, and manufactures of woollens, linens, sugar, machinery, and chemicals. In the vicinity are some ruins, falsely identified as the old castle of Ascania, the original seat of the House of Anhalt.

Ascidians, or TUNICATES, are a class of degenerate survivors of ancestral vertebrates. They were observed and well characterised by Aristotle, but were never really understood till 1866, when the discovery of their complete life-history warranted naturalists in removing them from their random position beside molluscs to the base of the vertebrate series. The larvae exhibit unquestionable vertebrate characters—viz. a spinal cord, brain, and cerebral eye, a notochord (q.v.), gill-slits, ventral heart, &c. Except in Appendicularia, however, the vertebrate characters of the larvae are to a large extent lost in the usually sessile degenerate adult. The tail shrivels up, the notochord and spinal cord disappear, the brain is represented merely by a small ganglion, and the whole symmetry of the body is altered. The ordinary ascidians, the sea-squirts, so called from their power of jerking out water when touched, are common along the coasts of all seas, ranging from low water to twenty fathoms, and usually attached to stones or shells, while some of the more complex forms are free-swimming. Few of them measure separately more than 3 or 4 inches, and most of them decidedly less, but the more or less intimate colonies frequently formed often attain larger dimensions. Chains of free-swimming ascidians sometimes occur several feet in length.

The following account refers primarily to a simple ascidian, and ought to be prefaced by reading the account of Appendicularia (q.v.), which, as has been noted, retains the larval characters lost in other ascidians. The animal has a double-mouthed flask shape, and is enveloped in a transparent, gelatinous, external sheath, which is secreted by the real skin. This test is remarkable as containing Cellulose (q.v.), the substance which forms the cell-wall of vegetable organisms. Through one of the apertures which are usually fringed with minute lobes, and often bear little coloured spots, the water enters the body; through the other the water, faeces, and reproductive elements are expelled. The anterior region of the alimentary canal forms a large respiratory pharynx, such as also occurs in one worm-like form, *Balanoglossus*, in *Amphioxus* (q.v.), and in all vertebrates in the embryonic stage at least. As in Appendicularia, a pair of involutions from the skin meet outgrowths from the gut, and establish a primitive respiratory communication with the exterior. In

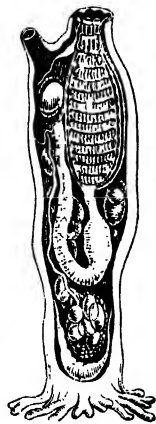


Fig. 1.

Structure of a simple Ascidian, showing inhalant aperture, leading into respiratory pharynx; looped alimentary canal, opening along with genital duct into cloacal chamber; nerve ganglion between inhalant and exhalant apertures; reproductive organs near the base, eggs in body-cavity, &c.; heart at very base; fixing processes. (After Haeckel.)

the ascidian, however, this simple structure is replaced, as afterwards described, by a multitude of gill-slits opening from the pharynx into a surrounding chamber which communicates with the exterior by a single aperture. The water is drawn in by the mouth, passes through the richly ciliated slits of the pharynx, bathes the blood spread out on the walls, enters the surrounding chamber, and finds its way out by the excurrent orifice. By the same orifice the feces and generative products reach the exterior. The internal ventral surface of the pharynx exhibits a special groove, which bears cilia and secretes slime. By this means the food particles are caught and wafted along to the beginning of the food-canal proper. The groove, which here forms the nutritive region of the pharynx, is distinctly seen in amphioxus and young lampreys, and seems to be represented by the thyroid gland (see THYROID) of higher vertebrates. The oesophagus, beginning at the lower corner of the pharynx, leads into a stomach provided with a digestive gland, and the intestine loops upwards to end in the cloacal chamber. The pharynx is surrounded by a muscular sheath more or less interrupted. To this the squirting powers are of course due. The nervous system of the adult exhibits no trace of spinal cord; but consists simply of a ganglion lying between the two orifices, and giving off a number of nerves. In the larva the brain has in close association with it an embedded eye, a rudimentary ear, and a ciliated protrusion probably olfactory. The heart differs from invertebrate hearts in being a dilatation of a ventral vessel. It gives off vessels to the respiratory pharynx and other regions, and is remarkable for exhibiting an alternating direction of the circulation, as has also been observed in some worms (Gephyrea). The blood is pumped alternately in opposite directions, at intervals (30 to 200 pulsations) varying with the species and even individual. A closed sac near the respiratory pharynx has been found to contain nitrogenous waste products, and probably represents a kidney. The reproductive organs are usually hermaphrodite, and the testis is sometimes in extremely close association with the ovary. They lie far down in the body, and are often destitute of ducts. When these are present they open, as stated, into the excurrent cloacal chamber. The sex products are not usually ripe at the same time, and self-fertilisation is thus prevented. Asexual reproduction by budding is exceedingly common, and spreading colonies are thus formed. It was in one of the ascidians that the poet Chamisso first observed what is known as *Alternation of Generations* (q.v.)—i.e. that one or more asexual forms are interposed between the sexual. This alternation is sometimes very complicated.

The Tunicates, apart from Appendicularia, are conveniently divided into three groups—Simplicia, Composita, and Consorta (1) simple forms, including the ordinary sea-squirts, and those which live socially, but without losing their independence; (2) compound forms, where numerous individuals are subordinated in a colony which may be either sedentary or free-swimming; and (3) free-swimming forms in which the sexual generations are united in chains. The first lot may be represented by the common *Ascidia*, *Cynthia*, &c., some of which are eaten; by *Chevreulius*, which has a test with two movable flaps; by the stalked form *Boltonia*; and by the social *Clavelinas*. The Botryllide are among the commonest types of sedentary compound forms, while the brightly phosphorescent cylindrical *Pyrosoma* is free swimming. The members of the third group have a very complex structure, and exhibit alternation of generations. They are re-

presented by *Salpa* and *Doliolum*. In *Doliolum* the sexual generation (A) gives rise to an asexual form (B); this develops two kinds of asexual buds (C and D), from one of which the sexual generation (A) is again produced. The development of the ascidians, first observed by Kovalevsky in 1866, has secured their position as vertebrates. Stage for stage it exhibits the closest resemblance to the development of amphioxus. The fertilised ovum divides completely and regularly to form a hollow ball of cells (*blastosphere*). One half of this ball is depressed within the other, and the result of this *invagination* is the two-layered oval embryo known as a *Gastrula*. Along the dorsal side of this embryo an axial groove appears—the medullary groove, which becomes converted into a closed canal by the meeting of its two folds. Thus is formed the neural canal of the spinal cord. In the closure a communication is for a time left

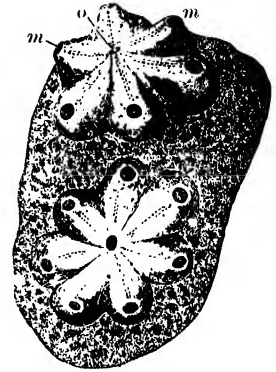


Fig. 2.—Compound Ascidian (after Milne-Edwards):

Rosettes of 6 or 7 united individuals, with separate inhalant, but united exhalant apertures; *m*, the inhalant aperture; *o*, the common exhalant aperture. The colonies are attached to a piece of seaweed.

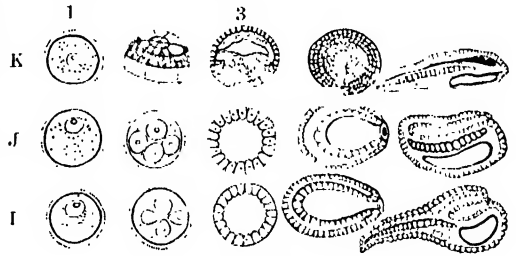


Fig. 3.

Development of: 1, *Ascidian*; 2, *Amphioxus*; 3, *Frog*. 1, ovum; 2, segmenting ovum; 3, morula or blastosphere; 4, gastrula; 5, further advanced embryo.

between the cavity of the canal and the original mouth of the gastrula. This communication, connecting nerve canal and primitive gut, is known as the *neurenteric canal*. On the back of the primitive gut, towards the posterior end, a band of cells is formed, the beginning of the notochord, which supports the growing tail, and represents in these lowly vertebrates the incipient 'backbone.' The sides of the primitive gut-cavity form posteriorly the lateral muscles. All this time the embryo has been inclosed within its egg-membrane, but with the growth of the tail, two or three days after fertilisation, the imprisoning case is burst, and there is liberated a free-swimming larva—strikingly like a tadpole. At the end of the closed canal, which may be said roughly to represent the spinal cord, there is a dilatation which may be called the brain. In this some progress soon becomes manifest, especially in the appearance of ear and eye, which remain in closest association with the brain, and are lost in the degenerate adult. The remains of the primitive gut form in various ways the respiratory pharynx, the oesophagus, stomach, and intestine of the adult ascidian.

About the time the larva is hatched, another very

important organ appears. A pair of outgrowths from the front of the gut meet, and fuse with a pair of dorsal involutions from the skin. The result is a paired atrial cavity, virtually open to the exterior by the two apertures of involution, and connected with the gut at the origin of the outgrowths—i.e. by gill-clefts. After a while a second pair of clefts appear, opening into the same atrial cavity. It must be noted at this stage that a secretion from the skin which began before the larva was hatched, has resulted in the formation of an intact 'test,' which clothes the entire larva, and is nowhere perforated. The free tadpole-like larva now fixes itself, first by a papilla and then by its test, as shown in the diagram, and with attachment the spinal cord, notochord, &c. begin to degenerate. An opening in the test appears opposite the mouth,

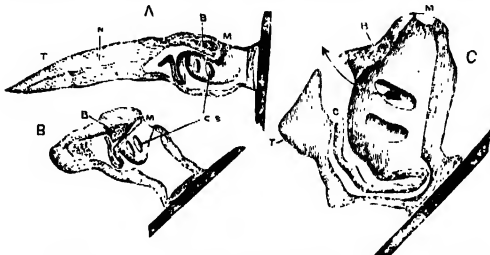


Fig. 4. — Attachment and degeneration of larval Ascidian (from Lankester):

A, Immediately after attachment to stone or shell; B, showing the degeneration of tail, spinal cord, &c.; C, a young Ascidian which exhibits the symmetry and essential structure of the adult; b, brain; m, mouth; n, notochord; g.s., gill slits; t, tail.

which thus becomes at length functional. The paired atrial cavities also open by perforations through the test, and dilate internally so as to embrace the whole of the respiratory pharynx. To this their walls become, indeed, attached, and a large number of gill-slits perforate this double wall. The two openings to the exterior coalesce into one, and the two cavities also unite to form a single peribranchial chamber. The anus has been gradually shunted dorsally, and opens into the atrial cavity in the region already referred to as the cloaca. The gradual modification of structure is well illustrated in the accompanying figure. The result is in most cases a vivid instance of that degeneration which not unfrequently follows from sedentary life. See AMPHIOXUS, APPENDICULARIA, DEGENERATION, VERTEBRATA; also Huxley's *Anatomy of Invertebrates*; Balfour's *Embryology*, vol. ii.; Ray Lankester's *Degeneration* (in the Nature Series).

Asclepiadaceæ (or *Asclepiadææ*), a chiefly tropical order of corollifloral dicotyledons, closely allied to Apocynaceæ, from which they are chiefly distinguished by the united filaments and coherent stamens to which the anthers adhere, as well as by the peculiar orchid-like pollen-masses. They are mostly shrubs, often with twining stems, and almost always possess milky juice, which is usually poisonous, sometimes so much so as to be used for arrow-points, but is occasionally bland, and even in the case of the Cow-plum of Ceylon (*Gynanema lactifera*) is used as food. It is sometimes also a source of caoutchouc. Some are prized by florists, notably the fragrant Stephanotis, the Wax-plant (*Hoya carnosa*), as well as species of the curious genus Ceropegia, and the cactus-like and carrion-scented Stapelia. A number of species are medicinal, as Indian Sarsaparilla (*Hæmidesmus indicus*); Mudar (*Calotropis gigantea*), so highly prized in the East Indies; *Sarcostemma glaucum*, the Ipecacuanha of Venezuela; *Tylophora asth-*

matica and *Screamone emetica*, the roots of which are used as emetics, and in smaller doses as cathartics, and the former of which is employed as Ipecacuanha in India. *Gynanema acutum*, which yields a purgative called Montpellier Scammony, and *Vincetoxicum officinale*, which possesses similar properties. Argel (q.v.), much used for adulterating senna, belongs to this order.—The down of the seeds is sometimes employed as a substitute for silk or cotton; and the stems of not a few species afford useful fibres, as those of the *Asclepias syriaca*, the Mudar and other species of *Calotropis*, natives of India and Persia, *Hoya viridiflora*, *Holostemma Rhecdianum*, &c. The Mudar or Yerenm fibre is highly spoken of, and the bark of *Marsdenia tenacissima*, a small climbing-plant, yields a fibre called *Jeteo*, of which the Rajmahal mountaineers make bowstrings of remarkable elasticity. The fibre of *M. Roylei* is used in Nepal. *Orthanthera cinnæa*, which grows at the base of the Himalayas, and has long leafless wand-like stems of 10 feet in height, yields a fibre of remarkable length and tenacity, suited for rope-making. The fibres of other species are used in Sindh for making the ropes and bands used in wells, as water does not rot them. A few species, as *Marsdenia tinctoria*, a native of Silhet, yield indigo of excellent quality. There are many species native in North America.

Asclepiades, a Greek physician, born at Prusa, in Bithynia, who flourished during the early part of the 1st century B.C. He seems to have wandered about as a not very successful teacher of rhetoric, before he finally settled at Rome, where, by the practice of medicine, he had risen in Cicero's time to considerable fame and wealth. He was opposed to the principles of Hippocrates. Pliny, who professes very little respect for him, reduces his medicinal remedies to five: abstinence from flesh, abstinence from wine under certain circumstances, friction, walking, and 'gestation' or carriage exercise, by which he proposed to open the pores, and let the corpuscles which caused disease escape in perspiration; for his leading doctrine was, that all disease rose from an inharmonious distribution of the small, formless corpuscles of which the body was composed. He also employed emetics and bleeding, but in general consulted the tastes and whims of his patients; his maxim being, that a physician ought to cure surely, swiftly, and agreeably. He is said to have been the first who distinguished between acute and chronic diseases, and the invention of laryngotomy is also ascribed to him; but his knowledge of anatomy was apparently very slight. Gumpert edited the fragments of his writings (Weimar, 1798).

Asclepias (or *Swallow-wort*) is the typical genus of Asclepiadaceæ (q.v.). The species are generally erect, seldom climbing and twining, herbaceous plants with opposite, whorled, or alternate leaves and flowers in umbels. They are mostly American.—*A. cornuti* (formerly called *A. syriaca*), Virginian Swallow-wort, or Virginian Silk, is a native of North America, and not of Syria, as was supposed. It is frequently cultivated in flower-gardens. The young shoots are eaten in North America like asparagus, as those of *A. stipitata* are in Arabia. A brown well-tasted sugar is prepared in Canada from the flowers; and the silk-like down of the seeds has been used for the manufacture of textile fabrics, either alone, or along with wool or silk, but is more frequently employed for the preparation of wadding, and for stuffing mattresses and pillows. The plant appears, however, to be chiefly valuable for the fibre of its stalks, which has been used in a small way for the manufacture of thread and cloth in some

parts of North America. The fibre is said to be of very superior quality, and that of other species furnishes muslin and paper in India. The plant rapidly extends by its creeping root-stocks, and readily becomes a weed. —The roots of several other North American species are used as diaphoretics and expectorants, as *A. incarnata*, *A. tuberosa*, &c. The latter is a very ornamental garden-flower, and is called Butterfly Weed and Pleurisy Root in the United States, where it is frequent on stony and sandy grounds. *A. curassavica* is called Wild Ipecacuanha in the West Indies, and a decoction of it is used by the negroes as an emetic and purgative. —It has been attempted to identify the Soma plant, mentioned in the Vedas as yielding an intoxicating beverage from its bruised stem and leaves, as an asepilas.

Ascoli (anc. *Asculum Picenum*), a city of Italy, on the Tronto, 83 miles S. of Ancona by rail. It has a fine cathedral and some Roman remains, and manufactures of majolica and glass-ware, silk, leather, &c. It suffered much from an earthquake in October 1878. Pop. (1881) 11,199. —**Ascoli** (anc. *Asculum Apulum* or *Saturnum*) is another episcopal city, 19 miles S. of Foggia. Pop. 6478. Pyrrhus here defeated the Romans, 279 B.C. —**ASCOLI PICENO**, a province of Central Italy, belonging to the Marches, with an area of 809 sq. m., and an estimated pop. (1885) of 219,962.

Ascoli, GRAZIADIO ISAIA, Italian philologist, was born of Jewish parentage at Görz in 1829, and was destined for a mercantile career, but early devoted himself to the study of comparative philology. His *Studi Orientali e Linguistici* procured him in 1861 a chair of philology at the Milan Academy, and besides founding the *Archivio Glottologico* (1873), he has published *Fonologia Comparata del Sanscrito, del Greco, e del Latino* (1870), *Studi Critici* (1861-77), &c.

Ascot Heath, a race-course in Berkshire, 29 miles WSW. of London, and 6 SW. of Windsor. It is circular, only 66 yards short of 2 miles in length; the races, which take place early in June, are generally attended by the royal family in semi-state. From the accounts of the Master of Horse for the year 1712, it would appear that they were instituted, not in 1727 as is commonly supposed, but by Queen Anne on August 6, 1711.

Asellio, GASPARO, a celebrated Italian physician, was born at Cremona about 1581, and died in 1626, having been professor of Anatomy and Surgery at Padua. In 1622, while at Milan, he discovered the lacteal vessels, which he seems, however, never to have understood or described with complete accuracy. He left a treatise, *De Lactibus* (1627). See LACTEALS.

Asellus, a generic name now disused, formerly applied to the cod and other Gadidae. It is retained in the pharmacopœias, in the name of Cod-liver Oil, *Oleum jecoris aselli*. —The same generic name is also employed to denote a genus of small Isopod Crustaceans, one of which, *A. aquaticus*, is common in stagnant ponds in Britain, and is sometimes called the Water Hog-louse. This genus is the type of a family, Asellidae. See WOOD-LOUSE.

Ases. See ASIR, SCANDINAVIAN MYTHOLOGY.

Asgard, the heaven of Scandinavian Mythology (q.v.).

Asgill, JOHN, an eccentric writer, born at Hanley Castle, Worcestershire (1659), was called to the bar in 1692. Having got into difficulties, he sailed in 1699 for Ireland, where an act for the resumption of forfeited estates promised plenty of lawsuits. His talents gained him a lucrative practice; and in 1703 he even obtained a seat in the Irish parliament. Three years before, however, he had pub-

lished a paradoxical pamphlet, bepraised by Coleridge, to prove that by the rules of English law, the redeemed need not die. Much to his own surprise, the public flew into a rage against this absurd production; the Irish parliament voted it a blasphemous libel, and the astonished author was expelled the House. In 1705 he returned to England, and entered the English parliament as member for Bramber, in Sussex. But the fame of his unlucky pamphlet haunted him perpetually; for the English House condemned it to be burned by the common hangman, and expelled Asgill in 1707. At last he found something like peace in the King's Bench and the Fleet, where he continued to practise professionally, and to indite innumerable pamphlets. He died in November 1738.

Ash (*Fraxinus*), a genus of trees belonging to the natural order Oleaceæ, and distinguished by very imperfect flowers, in which the calyx is obsolete, and the corolla either wanting or 3-4-partite; the fruit is a *samarra*, a seed-vessel winged at the edges and extremity. The leaves are deciduous, and are pinnate with a terminal leaflet. There are about fifty species, mostly natives of Europe and of North America. —The Common Ash (*F. excelsior*) grows wild in the middle and south of Europe and north of Asia, and is an undoubted native of Britain. It is a beautiful and unbragous tree, highly ornamental in parks, but extremely injurious to the grass or crops immediately around it. It rises to the height of 100-150 feet, generally with a smooth stem. The wood is white, tough, and hard, much valued by wheel-wrights, cart-wrights, coach-makers, joiners, and turners. It ranks next in value to that of the oak for strength and durability, and is adapted to a much wider range of uses. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres, and finely veined, and is then prized by cabinetmakers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The ash prefers a loamy soil, but grows in almost any, and succeeds in situations too elevated or too exposed for most other trees. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the Weeping Ash, with boughs bent almost straight down to the ground; the Curl-leaved Ash, with dark-green wrinkled or curled leaves; and the Entire-leaved Ash, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *F. simplicifolia*, *F. heterophylla*, &c. —The Small-leaved Ash (*F. parvifolia*) and the Lentisk Ash (*F. lentiscifolia*) are both natives of the shores of the Mediterranean, and are very graceful and ornamental trees. —The American Ash, or White Ash (*F. americana*), is readily distinguished from the Common Ash by its lighter bark and paler green leaves. It is abundant in New Brunswick and Canada, but becomes rare to the south of New Jersey. The trunk often rises more than 40 feet undivided. The wood is used for the same purposes as that of the Common Ash. —The Red Ash, or Black Ash (*F. pubescens*), is very similar, but of smaller size, and has a deep brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground. —The Black Ash, or Water Ash of the New England States, New Brunswick, &c. (*F. sambucifolia*), is a large tree with buds of a deep blue colour. —The Blue Ash of Ohio, Kentucky, Tennessee, &c. (*F. quadrangulata*), is also a large tree. The branches are quadrangular, the young shoots having on the angles four membranes

which extend their whole length.—The Green Ash (*F. juglandifolia*), readily recognised by the brilliant green of its young shoots, is chiefly found in the middle States; and the Carolina Ash (*F. caroliniana*), remarkable for the great size of its leaflets, chiefly in the southern States. Besides



Branch of Common Ash (*Fraxinus excelsior*): a, fruit.

these, North America produces a considerable number of other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the Common Ash, but none of them have proved of any value as forest trees in this country, in so far as experience gained from limited experiments in that direction shows.

Among other trees bearing the name ash in one form or other is the Manna Ash, or Flowering Ash (*Ornus europæa*), closely related to the true ash, and formerly named *F. ornus*, but now, on account of some structural distinctions in its flowers, generally regarded as a separate genus. The tree strongly resembles the Common Ash in foliage, but is smaller, and cannot be considered a timber tree of any importance. It is a native of the south of Europe, and is very abundant in Sicily, whence the finest manna is obtained. An allied species (*O. columbifolia*), a native of Greece and the Ionian Islands, also produces manna in quantity, but not equal in quality to that of the other species. Manna is the concrete juice of these two trees, and is obtained by means of transverse incisions in the bark, but it often also exudes spontaneously during the heat of summer. —The Mountain Ash, or Rowan Tree (q.v.), so called on account of the resemblance of its foliage to that of the Common Ash, belongs to the natural order Rosaceæ.

The ash has a peculiar importance in Scandinavian mythology. The first man and woman formed were Ask and Embla (Ash and Elm). The court of the gods is represented in the Edda as held under an ash, called Yggdrasil (q.v.). The ash was in many countries, and from ancient times, believed to be a powerful defence against witches, fairies, poisonous animals, and some diseases. In the Highlands of Scotland, ash sap was administered to infants as their first food; elsewhere, herd-boys preferred an ash rod as a herding stick; in Cornwall a single blow from an ash wand was death to an adder. Gilbert White tells that in Selborne ruptured children used to be passed naked between the sides of a cleft ash tree in order to be healed. It was held dangerous

to break a bough from the ash. The Mountain Ash (see ROWAN) had also magical powers.

The Poison Ash (*Ilex venenata*) is a gum or varnish bearing tree or shrub of North America, and belongs to the natural order Anacardiaceæ.—The Bitter Ash (*Simarouba officinalis*) yields the powerful tonic drug known as *Simarouba Bark*. The tree is a native of the West Indies.—The Cape Ash (*Elæbergia capensis*) is a valuable timber tree of the Cape of Good Hope; among the timber trees of the Cape it occupies a similar position to the Common Ash in this country, but is in no way related to the latter; it belongs to the natural order Meliaceæ.—Prickly Ash (*Xanthoxylum fraxineum*) is a native of the United States, where it is also called Toothache Tree. The bark, the leaves, and seed-vessels abound in volatile, aromatic, oily and resinous constituents, and a peculiar principle named Xanthoxylin, which are used in the United States in various forms for the cure of toothache and chronic rheumatism.

Ashango, a tribe of Western Equatorial Africa, inhabiting a thickly-wooded plateau (1000 to 1500 feet) south of the Ogowé, 230 miles from the Atlantic coast. They are great slave-holders, are very superstitious, and are broken up into several sub-tribes. Among these are the Obongo, a race of hairy, yellow-skinned dwarfs, whose average height does not exceed 4 feet 4 inches. See Du Chaillu, *A Journey to Ashango-Land* (1867).

Ashanti, or ASHANTEE, a negro kingdom in Western Africa, on the north of the Gold Coast, extending 5°–9° N. lat., and 0°–4° W. long., and shut off from the seaboard by the British protectorate, 80 miles broad, of the Gold Coast colony. It is hilly and well watered, but none too healthy, especially in the lower alluvial districts. The principal rivers are the Volta, Pra, and Assin. Population estimated at from 1,000,000 to 3,000,000, of whom a fifth are warriors. The country proper is one continuous forest; the land in the neighbourhood of the towns is carefully cultivated. The land is extremely fertile, producing maize, millet, rice, yams, tobacco, sugar, cocoa, the pine-apple, and other fine fruits, with gums, dye-woods, and timber. The principal exports are gold-dust, of which a considerable quantity is found, and palm-oil, together with slaves. The natives are remarkable for their skill in certain articles of manufacture; their cottons are beautiful, as also their earthenware and sword-blades. Human sacrifice is practised, and polygamy indulged in, the king being allowed 3333 wives. The capital is Coomassie (q.v.). Kpando, near the Volta, is an important centre of trade. So is Salaga or Paraha, which before the war of 1874 had an estimated population of 40,000.

The beginnings of the Ashanti kingdom are obscure, but its traditions point to an emigration some hundreds of years ago from a region north of the Kong Mountains, probably caused by the spread of the Mohammedan empire of Timbuctoo. Our first positive glimpse of it is got in the year 1700, when Coomassie was made the capital by Osei Tutu, who conquered Akin, Assin, Gaman, Denkira, and other neighbouring states, and became a sort of feudal sovereign over a large district. In their course of conquest over the Fantees, the Ashantis became involved in war with the British (1807–26), and were finally driven from the sea-coast. In 1873–74, in consequence of disputes arising in connection with the cession of the Dutch forts to Britain, they were again involved in a war with the same power; and an army under Sir Garnet Wolseley forced its way to the centre of the kingdom. After a severe battle at Amofof, and several days' fighting, Coomassie was taken.

February 4, 1874, and burned on the 6th, and, though the rainy season had set in, the army returned in safety to the coast. The king of Ashanti renounced all claims on the protectorate of Gold Coast Colony, promised to protect traders, and pay an indemnity of 50,000 ounces of gold to the Queen. In 1876 hostilities took place between the Ashantis and the Juabins, when the latter were defeated, and sought refuge within the British protectorate. See works by Bowdich (1819, new ed. 1873), Brackenbury (1874), W. Reade (1874), Stanley (1874), and Weitbrecht (1875).

Ashborne, a pleasant market-town of Derbyshire, 13 miles NW. of Derby. Its church (1241) has a fine spire, the 'Pride of the Peak,' 212 feet high, and an exquisite monument by Banks. There are also a grammar-school (1585) and a market-hall (1861). Prince Charles Edward was here in 1745, and here Moore wrote great part of *Lalla Rookh*. Pop. (1881) 3485.

Ashburton, a small town in the south of Devonshire, on the borders of Dartmoor, $9\frac{1}{2}$ miles NNW. of Totnes by rail. Till 1868 it returned a member to parliament. Pop. 2891.

Ashburton, ALEXANDER BARING, LORD, born in 1774, second son of Sir Francis Baring (q.v.), was for several years engaged in the United States, in the service of the great London mercantile house established by his father. On the death of the latter in 1810, he became the head of Baring Brothers & Co., having four years before been elected member for Taunton. He represented that place, Callington, and Thetford in the Liberal interest till 1832, and in 1833 was returned for North Essex as a moderate Conservative. In Peel's brief administration (1834-35) he was President of the Board of Trade, and was created Baron Ashburton in 1835. In 1842 his knowledge of business, and thorough acquaintance with American institutions, caused him to be appointed special ambassador to the United States to settle the north-west boundary question, and other disputes, which then threatened to involve the two countries in war. In August of that year he concluded the famous treaty of Washington, commonly called the Ashburton Treaty, by which the frontier line between the state of Maine and Canada was definitely agreed to. Seven-twelfths of the disputed territory, and the British settlement of Madawaska, were given by it to the United States; but it secured a better military frontier to Britain, and included heights commanding the St Lawrence, which the award of the king of Holland had assigned to the Americans. Provisions were also made for putting an end to the African slave-trade, and for the mutual extradition of criminals. Lord Ashburton opposed free-trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. He died May 13, 1848. His son, WILLIAM BINGHAM BARING, second Lord Ashburton (1799-1864), held two or three offices, but is chiefly remembered through his first wife, who made their house a meeting-place of politicians and men of letters, among the latter Thackeray and Carlyle.

Ashburton River, an unnavigable stream of Western Australia, rising in the mountains west of the Great Desert, and flowing 400 miles north-westward into Exmouth Gulf. Its lower course was explored by Sholl in 1866, its upper by Giles in 1876.

Ashby-de-la-Zouch, a town of Leicestershire, near the source of the Mease, a tributary of the Trent, 18 miles NW. of Leicester. It owes its suffix to the Norman family of La Zouch. Their ruined castle, celebrated in Scott's *Ivanhoe*, and rebuilt in 1480 by Sir William Hastings, crowns a

height to the south of the town. Mary, Queen of Scots, was imprisoned here. In the church are the tombs of the Hastings or Huntingdon family. Leather is the staple industry. Pop. (1881) 4536.

Ashdod, the New Testament AZOTUS (now *Esdud*), a village on the Mediterranean, 21 miles S. of Jaffa. It was formerly one of the chief cities of the Philistines, strongly fortified, and the scene of numerous contests between that race and the Jews. Into this city the ark of the covenant was brought by the Philistines, and placed in the temple of their god Dagon. About 715 B.C. the town was taken by Tartan, general of the Assyrians; and in the following century it was captured by the Egyptians, under Psammetichus, after a twenty-nine years' blockade and siege. It was destroyed by the Maceabees, and though afterwards rebuilt by the Romans, never regained its early importance. Esdud is now a miserable village with a population of about 300.

Ashdown, the seat of Lord Craven, in West Berkshire, $3\frac{1}{4}$ miles NW. of Lambourn. Here, in 871, Ethelred and Alfred gained the great victory of *Æscun* over the Danes.

Asherā, the name of a Phœnician goddess, or rather of the idol itself by which the goddess was symbolised. The name is frequently mentioned in the Old Testament in connection with Ashtoreth and her worship, and it appears certain that the latter is the proper name of the goddess, while Ashera is her image or symbol. The image was always of wood, and the most probable etymology of the name (Heb. *āshēr* = *yāshar*, 'to be straight') seems to point to the phallic emblem and the licentious rites associated with the worship of Ashtoreth. The translators of the Authorised Version, following the renderings of the Septuagint and the Vulgate, translated the word by 'grove,' spite of the difficulties offered by such passages as 2 Kings, xxi. 7, and xxiii. 6; but this error has disappeared in the Revised Version.

Ashes, the remains of animal and vegetable bodies after burning. It is not strictly correct to speak of the ashes of a mineral. When lead, for instance, is exposed to heat, it turns to dross, which has the appearance of ashes, but is merely the lead combined with oxygen. In the same way, volcanic ashes, as they are called, are only a finer kind of pumice-stone, the solidified scum of molten lava. The ashes of organic substances destroyed by fire consist of the fixed salts contained in these substances. In land-plants, the most important are salts of potash, along with silica and lime; in sea-plants, soda takes the place of potash. By lixiviation of the ashes, the potash or soda is dissolved and separated from the insoluble mass, and is then purified by crystallisation. The ashes of sea-plants contain also more or less iodine. Peat and turf ashes contain, besides alkalis, more or less clay and sand; the same is true of pit-coal, which sometimes contains iron.

At one time the ashes or inorganic ingredients of plants were considered unessential to their existence. But the progress of vegetable chemistry has taught that a certain proportion of saline food is absolutely necessary to the development of plants. The analysis of the ashes of the different kinds of vegetable substances has since become of great interest.

The ashes of animal bodies do not differ greatly from those of vegetables. Bone-ashes consist essentially of lime united with phosphoric acid. This bone-earth is very valuable as manure for grain. In well-wooded countries, ashes from burnt wood form an article of considerable trade. They are much used in the processes of soap-boiling, bleaching, dyeing, glass-making, &c. Wood-ashes

are also used in washing and other domestic processes, as a cheap preparation of Potash (q.v.), better known under the names American ashes or pearl-ash.

The presence or absence of ashes is frequently a most important factor in deciding as to the adulteration of articles of commerce. Thus if a sample of milk, flour, mustard, or other substance, on being dried and incinerated, with the necessary precautions, yields more ash than is normally present, it is strong evidence of adulteration, and the analyst can then apply his tests to the ashes obtained, and so determine the nature of the substance which has been added. For volcanic ash, see VOLCANO.

Ashford, a market-town of Kent, 14 miles SW. of Canterbury, and 56 SE. of London. It is an important railway junction, and the seat of the South-eastern Railway workshops. Eastwell Park, occupied by the Duke of Edinburgh, lies 3 miles to the north. Pop. (1851) 4092; (1881) 9693.

Ashington, a parish of South Essex, 2½ miles N. of Rochford. Here, in the battle of Assandun (1016), the sixth fought in the year, Canute defeated Edmund Ironside.

Ashkenaz, the name of a northern people mentioned in the table of races given in Gen. x., located in Armenia or its neighbourhood. The later Jews identified it with Germany. At the present day, the Polish and German Jews are termed *Ashkenazim*, as opposed to the *Sephardim*, the Spanish and Portuguese Jews. They have different synagogues, in which a somewhat different ritual and a different pronunciation of Hebrew are used, though there is no doctrinal distinction, nor now any disinclination to social intercourse and intermarriage.

Ashland, a post-borough of Schuylkill county, Pennsylvania, 119 miles NW. of Philadelphia by rail. It depends principally upon its rich mines of anthracite coal; but it has also foundries, machine-shops, and several mills. Pop. (1880) 6052; (1887) 8000.

Ashlar, or ASHLER, building-stone squared hewn, as distinguished from rubble or rough stones which are used as they come from the quarry without being dressed. Ashlar is laid in regular courses in building, and is of various kinds, according to the style of working that side of the stone which is to form the facing of the wall.

Thus there are *tooled* ashlar—the marks of the tooling being either *random* or in *grooves*; *polished* ashlar, in which the face of the stone is rubbed smooth; and *rustic* ashlar, in which only the joints are accurately hewn, the face of the stone being left projecting irregularly. Quarriers apply the term ashlar to squared stones before being hewn. The word is derived through the old Fr. *aiseler*, from Lat. *axillaris*, which is from *axilla*, a diminutive of *axis*, 'axle,' 'plank.' In old documents, the term appears under a variety of forms, such as *achlere*, *ashelar*, *aslure*, and *estlar*.

Ashley, LORD. See SHAFTESBURY.

Ashmole, ELIAS, antiquary, was born at Lichfield, 23d May 1617, and commencing the study of law when only sixteen, in 1638 became a solicitor. During the Great Rebellion he embraced the Royalist cause, and was appointed a captain of

horse and comptroller of the Ordnance; but at the same time exhibited his love of study by entering Brazenose College, Oxford, where he sedulously applied himself to mathematics, natural philosophy, astronomy, astrology, and alchemy. In 1646 he became acquainted with Lilly and other famous astrologers; and in 1650 he edited a work of Dr Dee's, to which he subjoined a treatise of his own. In 1652 he issued his *Theatrum Chymicum*, and in 1672 his *magnum opus*, a *History of the Order of the Garter*. At the Restoration, various honours and emoluments were conferred upon him; and thenceforward he mainly devoted himself to heraldic and antiquarian studies. In 1682 he presented to the university of Oxford a fine collection of rarities, bequeathed him by his old friend Tradescant, and known as the Ashmolean Museum. He died 18th May 1692. Among his friends were Selden and Dugdale, whose daughter became his third wife. See his quaint Diary (1717).

Ashmun, JEHUDI, an American philanthropist, was born at Champlain, New York, in 1794. He was educated for the ministry, but eventually became editor of a magazine in which he advocated the views of the African Colonisation Society for founding a colony of liberated negroes on the west coast of Africa. Receiving an appointment as one of the agents of this association, he conducted a body of liberated negroes from Baltimore, and landed at Cape Mesurado, the seat of the infant colony of Liberia, in the autumn of 1822, and assumed the superintendence of affairs. Here, for more than six years, he devoted himself to establishing, on a fair and solid basis, this colony, so full of hope for the American negro (see LIBERIA). His health failing, he returned to America, and died at New Haven, Connecticut, 25th August 1828. See his *Life*, by R. R. Gurley (1835).

Ashraf, a town in the Persian province of Mazanderan, near the south coast of the Caspian Sea, 56 miles W. of Astrabad. It was a favourite residence of Shah Abbas the Great, and was adorned by him with splendid buildings, of which only a few miserable ruins now remain. It still contains over 800 houses, and has some trade in the cotton and silk produced in its vicinity.

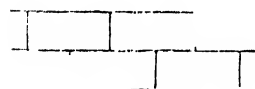
Ashtabula, a rapidly increasing town of the state of Ohio, U.S., on the Cleveland and Erie Railway, 3 miles from Lake Erie, and 49 miles NE. of Cleveland. Pop. (1880) 4445; (1890) 8338.

Ash'taroth. See ASTARTE.

Ashton-in-Makerfield, a township in South Lancashire, 4 miles S. of Wigan. Pop. (1881) 9825, chiefly engaged in collieries, and in the hardware manufacture.

Ashton-under-Lyne, a town of South-east Lancashire, 6½ miles E. of Manchester. It was enfranchised in 1832, and returns one member to parliament. A great seat of the cotton manufacture, it suffered severely during the cotton famine (1861-65). The population is also employed in bleaching, dyeing, and calico-printing, in collieries, and in the manufacture of machines, bricks, &c. Among the buildings are the town-hall (1841), the infirmary (1860), and the old parish church, with tombs of the Assheton family, from whom the town got its name. Pop. (1851) 29,791; (1891) 40,494.

Ash-Wednesday, the first day of Lent (q.v.), so called from the Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom, probably introduced by Gregory the Great (590-604), was sanctioned by Pope Celestin III. in 1191, and afterwards generally prevailed. Before mass, the ashes are consecrated on the altar, sprinkled with holy water, and signed three times



Ashlar.

with the cross, while the priest recites the words, *Memento quod cinis es, et in cinerem reverteris* ('Remember that thou art dust, and into dust thou shalt return'). Next they are strewed on the heads of the officiating priests, the clergy, and the assembled people. The ashes are those of the palms consecrated on the preceding Palm Sunday (q.v.).—The Protestant Church in Germany does not celebrate Ash-Wednesday. In the Church of England it is observed, but without anything of the ceremony from which it derives its name; and the *Communion* (q.v.) is appointed to be read in the service for this day.

Asia, the largest of the divisions of the world, occupies the northern portion of the eastern hemisphere in the form of a massive continent which extends beyond the Arctic circle, and by its southern peninsulas nearly reaches the equator. The origin of its name remains unknown. Herodotus failed to explain it; modern philology has also failed. It appears, however, most probable—the first elements of our geographical terminology having originated in Greece—that Asia was a local name given to the plains of Ephesus, and that this name was gradually extended to the Anatolian peninsula, and later on to the whole of the continent.

Viewed in their broad features, Europe and Asia constitute but one continent, extending from west to east, and having the shape of an immense triangle, the angles of which are Spain in the west, the peninsula of the Tchukcheis in the north-east, and that of Malacca in the south-east. The Arctic Ocean in the north, the Pacific in the east, and the Indian Ocean, continued by its narrow gulf, the Red Sea, which nearly reaches the Mediterranean, inclose the continent of Asia. This immense mass of land touches the latitude of 77° 34' N. in Cape Tchelyuskin, while Cape Barro, at the extremity of the peninsula of Malacca, and 5350 miles distant from the former, falls short by 1° 15' of reaching the equator. Cape Baba, in Asia Minor, advances as far west as the 26th degree of longitude, and the utmost N.E. extremity of Asia—East Cape, 5990 miles distant from Cape Baba—protrudes to the 190th degree (12 hours 40 minutes) to the east of Greenwich. The area covered by Asia and its islands is 17,255,890 sq. m.; that is, almost exactly one-third of the land-surface of the globe (32 per cent.). It is a seventh larger than the surface of both Americas together, by one-half larger than that of Africa, and more than four times larger than that of Europe.

Boundaries.—Neither by its geographical features nor by its climate, vegetation, and animals, still less by the ethnographical features of its inhabitants and their history, can Asia be sharply separated from Europe. The physical features of both continents show a manifold interdependence; and however pronounced the individuality of Europe in the west, it melts into Asia in its eastern parts; while throughout its history Europe has been influenced by Asia in a thousand ways. Our races have been mixed with those of Asia; in Asia our civilisation, our religions, our political and social institutions have had their origin; and ever since Europe made an independent start in history, it has never ceased to feel the influence of Asia. Geographically speaking, Europe is a mere appendix to Asia, and no exact geographical delimitation of the two continents is possible. The low Urals are not even an administrative frontier: European Russia extends over their eastern slope. Farther south, the dry steppes of Asia penetrate into Europe and pass indistinguishably into the prairies of Russia. Caucasus is surely Asiatic in character; but, to separate it from Europe, one must resort to

the old dried-up channel of the two Manytch rivers, which at a geologically recent epoch connected the Black Sea with the Caspian. As to Asia Minor—also purely Asiatic in structure and inhabitants—it so closely approaches Europe that the Sea of Marmora and its narrow river-like straits seem almost an artificial boundary, while the islands surrounding Asia Minor mingle with those which continue Greece to the east, and the Anatolian plateau seems to be continued in the Balkan Peninsula.

The line of separation from Africa is better defined by the narrow Red Sea. But Arabia participates so largely in the physical features of Africa that it is in a sense intermediate between the two continents.

In the south-east, the numberless islands of the Dutch Indies—relics of a sunken continent—appear as a bridge towards Australia; and although a boundary between Australia and Asia has been drawn through the Timor Sea, or rather between the islands Bali and Lombok, in the Sunda Archipelago, still it is a boundary only in a limited sense: it only separates two famas.

In the extreme north-east, Asia sends out a peninsula to meet one of the Alaskan peninsulas in America, from which it is separated only by a shallow and narrow channel, Behring Strait. Plants, animals, and men freely migrated over this ferry; while the geographer sees in the two peninsulas a line of connection between the two great plateaus of the Old and New World.

Peninsulas. Although the coasts of Asia are much more indented by gulfs and peninsulas than those of Africa or America, still it stands in this respect much behind Europe, and has 1 mile of coast-line for every 337 sq. m. of its area, that is, three times less than Europe; besides, about one-fifth of its shores is washed by the ice-bound Arctic Ocean (9900 miles out of 51,000), or by the foggy and icy sea of Okhotsk, where navigation is possible only for a few months, or even weeks, in each year. Its peninsulas comprise nearly one-fifth of its surface (19 per cent., as against 28 in Europe), but they partake of the massive structure of the continent; they are massive too, and, as a rule, little indented. Three immense offsets continue the continent of Asia into more tropical latitudes. Arabia, India, and the Indo-Chinese Peninsula—and some likeness exists between them and the three southern peninsulas of Europe—Spain, Italy, and the Balkan Peninsula, surrounded by its archipelago of hundreds of islands. Asia Minor protrudes between the Black Sea and the Mediterranean as a huge mass of tableland broken by narrow gulfs in its western parts. In the Pacific there are only three large peninsulas—Corea, Kamchatka, and that of the Tchukcheis—the whole of the Pacific coast having the shape of wide curves turning their convexity to the sea, and indented by but a few gulfs. The flat, ever frozen, uninhabitable peninsulas of the Arctic Ocean, Taimyr and Yalmal, could play no part in the growth of civilisation.

Seas, Coasts. The early inhabitants of Asia had no Mediterranean Sea to serve as a high-way of communication between the southern peninsulas. The gulfs which separate them—the Arabian Sea and the Bay of Bengal—are wide, open divisions of the Indian Ocean. The narrow, elongated Red Sea penetrates between the dry, stony, and barren lands of Africa and Arabia; and only now, since it has been brought into communication with the Mediterranean by the Suez Canal, has it become an important channel of traffic. The Persian Gulf, inclosed between the deserts of Arabia and the mountains of Persia, is bordered by regions scarcely

inhabited. Asia's true Mediterranean is on the east, where several archipelagoes, like so many chains of islands, mark off from the ocean the Southern and Eastern China Seas, whose Gulfs of Siam and Tonkin, and especially the Yellow Sea with the Gulf of Pechili, penetrate into the continent. Those gulfs, since the dawn of history, have promoted the development of marine traffic in these regions, and would have done so still more but for the dreadful typhoons, the constant danger of these seas. The Sea of Japan is less favoured by climate and currents, and it has on its west the inhospitable coasts of Northern Manchuria, where Russia is trying to establish a maritime centre at Peter the Great Bay. The Sea of Okhotsk and that of Behring, although possessing fine gulfs (Ghizhiga, Anadyr), have no importance for the maritime traffic of nations. Still less the Arctic Ocean, with its wide estuaries and bays, and the Kara Sea, through which ships find a passage amidst the broken ice-crust for only a few weeks in the year.

Islands.—The islands of Asia are very numerous, and cover an aggregate of no less than 1,023,000 sq. m. (nearly 6 per cent. of Asia's surface). The coasts of Asia Minor are dotted with islands, of which the Sporades connect it with Greece. Cyprus was, from remote antiquity, a centre of civilisation; so also Ceylon. The Laccadives and Maldives are mere coral atolls, rising amidst the Indian Ocean, and sheltering some 200,000 inhabitants. The islands of East Asia are much more important. A narrow strip of islands, some large like Sumatra (177,000 sq. m.) and Java, others mere reefs, extend in a wide semicircle, under the name of Andaman and Sunda Islands, from Burma to Australia, separating the Indian Ocean from the shallow Java Sea and the Malay Archipelago. This last—an immense volcanic region inhabited by the Malay race—comprises the huge Borneo, the ramified Celebes, and the numberless small islands of the Moluccas, the Philippines, &c., connected on the north-west with the Chinese coast by the island of Formosa. This latter, as well as Hainan, may be properly considered as part of the Chinese mainland. The Loo-choo (Liu-kiu) Islands and the Japanese Archipelago, the latter joining Kamchatka by the Kuriles, continue farther NE. this chain of islands which border the coasts of Asia. Sakhalin is so closely situated to the continent that it was long regarded as a peninsula. In the Arctic Ocean, the small Bear Islands, the archipelago of the Liakhof, Anjou, and De Long Islands, as also those of the Kara Sea, are lost amidst ice-fields, and are but occasionally visited by whalers. Kellett's, or Wrangel's Land, off the peninsula of the Tchukchis, has been merely sighted, not yet visited.

Orography.—Asia is at once the largest and the highest of all continents. Not only has it a number of mountains which exceed by five and six thousand feet the loftiest summits of the Andes; it has also the highest and the most extensive plateaus. If the whole mass of its mountains and plateaus were uniformly spread over its surface, the continent would rise no less than 2885 feet above the sea, while Africa and North America would respectively reach only 2165 and 1950 feet.

High plateaus are the predominant feature of Asia's orographical structure; they occupy nearly two-fifths of its area. One of them—that of Western Asia, including Anatolia, Armenia, and Iran—extends in a south-easterly direction from the Black Sea to the valley of the Indus; while the other—the high plateau of Eastern Asia, still loftier and much more extensive—stretches NE. from the Himalayas to the north-eastern extremity of Asia, resembling in shape a South America pointing NE.,

and meeting at Behring Strait the north-western extremity of the high plateau of North America. These vast regions, mostly unfit for agriculture and human settlement, poorly watered over wide areas, and assuming there the character of dry deserts, divide Asia into two parts—the lowlands of Siberia and the Aral-Caspian depression to the north of the plateau-girdle, and the lowlands of Mesopotamia, India, and China to the south. These could enter into only occasional communication across the thinly peopled plateaus, and they have followed quite independent lines of development. The southern lowlands are themselves separated into three distinct parts, which have developed independently, without enjoying that continuous mutual intercourse which constitutes the distinctive feature of European civilisation.

(1) *Plateau of Eastern Asia.*—The high plateau of Eastern Asia, which stretches for 4500 miles to the NE. from the Himalayas, occupies more than one-fifth of the superficies of Asia. Its surface is not quite flat, as the rather inappropriate orographical name of 'plateau' might suggest. It has its depressions; it has also on its north-western borders several broad trenches which are cut in its mass, like gigantic railway-trenches leading with an imperceptible gradient from the lowlands to the heights of the plateau. For many consecutive geological periods these trenches were either channels for the drainage of the waters discharged by the plateau, or else gulfs of the seas which surrounded it, so that now their banks, water and glacier worn, appear like chains of mountains to the traveller who follows their flat bottoms. The plateau has also mountain-ridges rising several thousand feet above its surface, and high border-ridges. But its depressions do not sink to the level of the lowlands, their lowest parts being still two or three thousand feet above the sea; while the chains of mountains, although rising to high absolute altitudes, are still relatively low, their bases on the plateau being at a level of several thousand feet above the sea. They do not display the diversified aspect usually characteristic of alpine regions intersected by deep fertile valleys; and unvaried monotony—monotony of orographical features, climate, flora, and fauna—remains the distinctive feature of the plateau over immense distances. For thousands of miles the traveller finds the same broad and open valleys, the same harsh climate, the same species of plants and animals, the same unfitness for agriculture.

The highest parts of the East Asian plateau are in Tibet, where it has a width of 1600 miles from west to east, and an average height of 18,000 feet. Even the bottoms of its lowest valleys are at a higher altitude than the summit of Mont Blanc, and only cattle-breeding is possible in these high, cold, dry valleys. The highest plateau of the earth is girdled by the highest chain of mountains, the Himalayas—a typical 'border-ridge' which has one foot on the high plateau, and the other in valleys ten to fifteen thousand feet deeper, where the palm and vine grow freely. This immense chain of snow-clad peaks, which in Europe would reach from Gibraltar to Greece, raises its lofty summits above 20,000 feet; its lowest passes are 15,000 feet high, and Gaurisankar or Mount Everest—the highest mountain of the globe—has its snow-cap at a height of 29,000 feet, that is, $5\frac{1}{2}$ miles above the sea. A series of chains separated from the Himalayas by high longitudinal valleys run parallel to them in the north, and of these, the Karakorum Mountains rise high above the snow-line; their loftiest peak, the Dapsang, is 28,700 feet high. In the east, the plateau of Tibet is bordered by the snow-clad mountains through which the great rivers of China, Burma, and

Siam find their way to the lowlands. They are still very little known.

In the north-west, the Tibet plateau joins another much smaller, but very high plateau—that of Pamir ('the roof of the world'), which covers an area of 37,000 sq. m. Several chains of mountains running NE. diversify its surface, but still the travellers crossing it need not descend to a level lower than from 10,000 to 11,000 feet until they have crossed its northern border-ridge, the Alai Mountains, whose peak Kaufmann (22,500 feet) exceeds twice the highest summit of the Pyrenees. The Tagama peak, in Eastern Pamir, reaches a height of 25,800 feet. Farther north and north-east of the Pamir, a wide, intricate complex of several high chains, running mostly from WSW. to ENE., with several ridges shooting from them to the NW., covers an aggregate area nearly as large as Germany. These mountains are known under the general name of Tian-shan (q.v.). The great Khan-tengri rises there to 24,000 feet, and most of the Tian-shan ridges are snow-clad; even the outer ridges raise their summits to fifteen or sixteen thousand feet—that is, above the upper limits of tree vegetation, while some of their deep, fertile valleys have been transformed into veritable gardens and granaries by means of irrigation.

(2) *Central Asian Depression.*—In the north, the plateau of Tibet is bordered by a succession of lofty chains (Kuen-lun, Altyn tagh, Nan-shan), reaching more than 20,000 feet in their highest parts. These chains separate it from the great central depression which is occupied by Eastern Turkestan in the west, and by the Desert of Gobi in the east. This great depression—including the Han-hai, or 'dried-up sea,' of the basin of the Tarim—must be considered, however, only as a lower terrace of the great plateau of Eastern Asia. It has an altitude of from 3000 to 4000 feet in the west, and 2200 feet in its lowest part—the depression of Lake Lob-nor. It has no outlet to the sea—not even to Lake Aral or the Caspian: the winds which might bring the moisture of the ocean are deprived of it in crossing the higher plateaus and border-ridges which surround it, and this immense bottom of an immense interior sea is rapidly drying up. All through the historical period it has continued to dry up, till Lob-nor, which covers an area four times as large as that of the Lake of Geneva, has become now but a wide marsh, with a maximum depth of some 15 feet—a small remnant of a much larger sea which existed at the dawn of history, and in whose rapid desiccation we probably must look for one of the causes which impelled the Huns and the Mongols to their great migrations towards the west. Human settlements, secluded from the rest of the continent, and rarely visited now by a few caravans, are scattered only in the upper parts of the tributaries of the Tarim, where the water of few and scanty rivers may maintain life; but they were much more numerous before, as is testified by ruins of great cities, now buried under the drifting sands. In the Eastern Gobi, where the SE. monsoons of the Pacific during the summer and the NW. winds from Siberia during the winter still bring some moisture, the gravelly soil is covered with grass for a few months each year; but in the west, man must sustain a hard struggle against the moving sands raised by storms in the air, more dreaded than the worst snow-storms of the far north. In the south-east, towards the chains of Ala-shan and In-shan, the wild horse and the wild camel—ancestors of our domesticated breeds—find their last refuge on lonely pastures scarcely ever visited by man.

(3) *Northern Part of the Great Plateau.* The dry and barren ridge called Eastern Tian-shan,

and two other ridges running NW., separate the Han-hai depression of Central Asia from the trenches of Urumsai and Urungu, which descend west to the lowlands of Siberia towards Lakes Balkhash and Zaisan. Beyond the great depression the plateau rises again, and reaches an average height of from 4000 to more than 5000 feet in the upper parts of the Yenisei and Selenga, and about 2000 feet in its lowest part—the small depression of Lake Ubsa-nor. The Ektagh (or Great Altai) in the west, the Khangai and the Yablonovoi ridge farther east, separate this upper terrace of the plateau from the lower terrace of Eastern Turkestan and Gobi. It would seem that the Yablonovoi ridge is continued farther SW. by a succession of ridges which probably join the Tian-shan Pelau (Eastern Tian-shan), and which separate the higher Siberian terrace of the plateaus from the lower terrace of the Gobi. This last has in the east its border-ridge—the Great Khingan (6000 to 8000 feet)—which is a continuation of the mountains of the middle Hoang-ho; it is pierced by the Amur below Albazin, and in the north-east joins the Stanovoi or Okhotsk coast-ridge. See SIBERIA.

In the north-west, the plateau is bordered by the snow-clad Saïnghem ridge of the Altai (8000 to 9000 feet), which appears as a continuation of the Tian-shan and the Ala-tau, and which is continued farther NE. by the West Sayans. A wide indentation, however, occupied in its deepest parts by Lake Baikal (and very much like the indentation made by the Caspian in the plateau of Western Asia), breaks the continuity of the border-ridge. This last reappears again in the east of the Siberian lake as a huge wall, known under the names of Khamar-daban, Barguzin, Muya, and Tchuira mountains. They rise from 6000 to 8000 feet above the sea, reaching the snow-line only in the Munkus-Sardyk (11,900 feet), and presenting their steepest slopes towards Siberia, while their inner base lies on a plateau 3500 to 4500 feet high. This immense wall is pierced by the broad trench-like valleys of the Selenga and its tributary the Uda, which are respectively the two great highways from Lake Baikal to Mongolia and the Upper Amur. A broad zone of alpine tracts more than 150 miles wide and 2000 miles long—the Altai, the Kuznetskiy Ala-tau, the Baikal, Lena, Olekma, and Vitim mountains—fringes this plateau in the west, from Lake Zaisan to the far north-east of Siberia. It consists of a series of short chains, mostly running NE., with numerous spurs, and intersected by deep and narrow valleys, clothed with forests and rich in auriferous deposits. A like succession of alpine tracts, although narrower, follows the south-east edge of the plateau in China and Manchuria. As to the plateau itself—whose surface is diversified by several chains rising above its level—its broad, flat, and open valleys, unfit for agriculture in consequence of their altitude, have none of the dryness of the plateau of Tibet. They are covered with a rich grass-vegetation, and are frequented by shepherds; while the slopes of the hills, thickly clothed with forests, are rich hunting-grounds. Farther north—in the Vitim plateau, the Uchur, &c.—the surface becomes very marshy, and the vegetation still poorer; its height does not now exceed 3500 feet, and it becomes narrower. Its north-eastern extremity—the abode of the Tehuktelis—is but very little known.

(4) *The Plateau of Western Asia.*—Several parallel chains of mountains, reaching 24,000 feet in their highest parts, and running NE. to SW.—the Hindu-Kush and its parallel chains—connect the great plateau of Eastern with that of Western Asia, which may be subdivided into three parts: Iran, Armenia, and Asia Minor. The plateau of Iran (425,000 sq. m.) is bordered in the north-east

by the border-ridges of the Paropamisus, the Kopet-dagh, which presents its steep, stony slopes to the Turcoman Steppes, and the Elburz (with its peak Demavend, 20,100 feet high), which describes a curve around the South Caspian shore; in the east it is fringed by several snow-clad chains, which separate the stony plateaus of Afghanistan and Beluchistan from the fertile valley of the Indus; and in the south-west it falls by several steep terraces towards the Persian Gulf and its continuation—the valley of the Tigris and Euphrates. The lowest parts of the Iran plateau, in the valley of the Helmand, which discharges its water into the rapidly desiccating Lake Hamun, are 3500 feet above the sea, and although fertile in the south-east, it assumes the character of a wide salt-desert towards the Caspian Sea. There it joins the plateau of Armenia—bounded on the north by the Anti-Caucasus, and in the south by the Kurdistan Mountains. The great salt lakes Van and Urmia have their levels at altitudes of more than 5000 feet; and Mount Ararat, which rises on the plateau, reaches a height of 16,969 feet. Farther west, the plateau of Armenia meets that of Asia Minor, all three together making a wide plateau, elongated towards the north-west, and having a length of 2700 miles, and a width of from 700 to 180 miles. Several chains of mountains running NE. and NW., and reaching more than 10,000 feet in their loftiest summits, intersect the plateau of Asia Minor, which is bordered by the Taurus Mountains on its Mediterranean coasts, and the Pontic Mountains on the Black Sea shore.

(5) *Separate Chains of Mountains.* The hilly tracts of Asia are not confined to the plateaus and their border-ridges. The Caucasus, an immense wall of snow-clad mountains, stretches NW. to SE. for nearly 800 miles along the border of the Armenian plateau, from which it is separated by the broad valley of the Kura. It reaches 18,560 feet in the Elburz (Elbruz) peak. The Urals, from 2000 to 4000 feet high, which separate Europe from Asia, are a broad belt of hilly tracts, stretching as a whole from north to south. Farther east, the Karatan and the Tarbagatai, as also the Verkhoiansk ridge in the far north, strike off from the alpine tracts which fringe the plateau, and have a direction perpendicular to them; while the Byrranga hills diversify the monotony of the *tundras* of the Taimyr Peninsula. The Yeniseisk Mountains, consisting of several chains running SW. to NE., contain rich treasures of gold-dust. Several chains, little known, and some of them volcanic, fill up the peninsula of Kamchatka. A number of parallel chains, 5000 to 7000 feet high—the Ikhmri alin, the Bureya Mountains, Pribrezhnyi, and Tartar run from the Gulf of Pechili to the Sea of Okhotsk, and are continued in Sakhalin Island; while other chains having the same direction form an outer submarine wall of Asia in Corea, the Japan Archipelago, and the Kuriles. The Nan-ling, Tayu-ling, and other smaller chains having also the same north-eastern direction, cross South China; and submarine chains belonging to the same system of parallel platings of the earth-crust are seen in the islands of Formosa and Loo-choo (Liu-kin). The Seravak chain of Borneo, continued NE. in the Palawan Islands, as also the mountains of Celebes, have the same direction; while the mountains of Sumatra and Malacca assume the perpendicular north-western direction which prevails in South-western Asia. A range of lofty volcanoes rises steeply from the very depths of the ocean in the islands of the Java Sea. The real orography of Burmah and Siam is yet hardly known.

The interior of the Indian peninsula is again occupied by the wide plateau of the Deccan, having an average height of from 1500 to 3000 feet, bordered

in the west by the Western Ghats (7870 feet high in Nila Ghiri peak) and the Cardaman Mountains, and in the east by the much lower and broader Eastern Ghats. The Pedrotallagalla peak in Ceylon rises 8330 feet high. The immense plateaus of Arabia, covered with sand-deserts interspersed with a few fertile regions, rise to altitudes of from 3500 to 4500 feet, and are intersected by several little-known chains of hills. Their south-eastern border-ridge—the Hadramaut—reaches nearly 7000 feet in its highest summits, and the north-western border-ridges—the Lebanon and Anti-Lebanon—have summits nearly 10,000 feet high; while in the deep valley of the Jordan the Dead Sea is sunk to a level of 1185 feet below that of the ocean.

(6) *Lowlands, Plains.*—The whole of North-western Asia is occupied by an immense lowland—Siberia—which joins in the south the wide Aral-Caspian depression. This lowland, whose level is less than five or six hundred feet, does not reach the outer borders of the above-mentioned alpine regions which fringe the great plateau of East Asia. It is separated from them by a belt of elevated, undulating plains rising to a level of from 1000 to 1500 feet, the limits of which may be roughly indicated by a line traced from Merv to Tomsk, and thence to Verkhoyansk. These plains, which assume the character of dry steppes towards the south, are as a whole highly suitable for agriculture and cattle-breeding. Not so the lowlands proper, which bear unmistakable traces of having emerged from the sea during the Post-Pliocene period. In the Aral-Caspian depression they often have the character of sandy deserts, and can be cultivated only where there is a belt of fertile Loess (q.v.) at the base of the mountains, and the streams issuing from the hilly regions yield sufficient water for irrigation. On the northern coast of the Caspian, the Aral-Caspian depression descends even below the level of the sea; while the dry plateau of Ust Urt rises to an average height of about 1000 feet above the sea. The southern parts of Western Siberia are a perfect granary, and are rapidly being colonised; but beyond the 56th or 57th degrees of latitude, the lowland assumes the character of marshy forests, almost totally unsuitable for settlements; and farther north, that of a treeless, barren, and ever-frozen tundra. A like belt of elevated plains, succeeded by one of lowland, runs along the great plateau on its south-eastern edge; and those parts of the plains which are covered in China with loess, as also those of Manchuria to the west of the Pribrezhnyi ridge, are the abodes of a dense agricultural population. In the Indo-Chinese Peninsula, the lowlands are limited to Tonkin, Cambodia, and the lower Menam and Irawadi, where they are fertile, but often marshy.

The wide space between the great plateaus of Western and Eastern Asia and that of the Deccan, watered by the Indus and the Ganges, is again an immense lowland, covering no less than 400,000 sq. m., and supplying the means of existence to 125 millions of inhabitants. Its western part suffers much from want of irrigation; but artificial canalisation rapidly conquers the desert (see INDIA). Another wide lowland, Mesopotamia, or the broad valley of the Tigris and Euphrates, was a cradle of civilisation from the remotest antiquity. Finally, the fertile lowlands in the north of the Caucasus are being rapidly colonised by Russian agriculturists.

Rivers.—It is easy to perceive from the above rapid sketch how much the orographical structure of Asia favours the development of very great rivers, whose drainage basins cover immense areas. Only three rivers—the Mississippi, the Amazon, and the Nile—surpass the largest rivers

of Asia, the Yenisei and the Yang-tse-kiang, both as to length and drainage areas; but owing to the scarcity of rain over large parts of Asia, the amount of water carried down by the largest rivers is, as a rule, disproportionately small as compared with American or European rivers. The predominant feature of Asia's hydrography is the existence of very wide areas having no outlet to the sea. On the great plateau of Eastern Asia, the region which has no outlet from the plateau, and whose water does not reach even Lake Aral or the Caspian—the Han-hai and Gobi—covers a surface larger than that of Spain, France, and Germany together. It is watered only by the Tarim, which supplies some irrigation-works in its upper parts, and enters the rapidly drying marshes of Lob-nor. This area is steadily increasing, and since 1862 we have had to add to it the drainage area (as large as England and Wales) of the Kerulen, which empties into Dalai-nor, but no longer reaches the Argun, a tributary of the Amur. The Ulyasutai River and the Tchagan-togoi now no longer reach Lake Balkhash; and the Urungi, which obviously joined the Upper Irtysh at no very remote date, empties into a lake separated from the Black Irtysh by a low isthmus not 5 miles wide. If we add, however, to this already wide area the drainage basins of Lake Balkhash with its tributaries, the Ili and other smaller rivers; the great Lake Aral, with the Syr-daria (Jaxartes) and Amu-daria (Oxus), as also the numerous rivers which flow towards it or its tributaries, but are desiccated by evaporation before reaching them; and finally the Caspian with its tributaries, the Volga, Ural, Kura, and Terek, we find an immense surface of more than 4,000,000 sq. m. that is, much larger than Europe—which has no outlet to the ocean. Four inland drainage areas more must be added to the above—the plateaus of Iran and Armenia, two separate areas in Arabia, and one in Asia Minor, the whole representing a surface of 5,567,000 sq. m.

The drainage area of the Arctic Ocean comes next. It includes all the lowlands of Siberia, its plains, and large portions of the great plateau. The chief rivers flowing north to the Arctic Ocean are the Obi, with the Irtysh; the Yenisei, with its great tributary the Angara, which brings to it the waters of Lake Baikal, itself fed by the Selenga, the Upper Angara, and hundreds of small streams; and finally the Lena, with its great tributaries, the Vitim, Olekma, Vilui, and Aldan. Owing to their great tributaries, and still more to the fact that each of them is formed by two great rivers of nearly equal importance, they permit navigation to be carried on, not only north and south, but also west and east, over wide distances in Siberia (q.v.).

Three great rivers enter the Pacific, and all three are navigable for thousands of miles: the Amur, composed of the Argun and Shilka, and receiving the Sungari—a great artery of navigation in Manchuria—the Usuri, and the Zeya; the Hoang-ho; and the Yang-tse-kiang, the last two taking their rise on the plateau of Tibet. They permit freighted boats to penetrate from the seacoast to the very heart of China. The Cambodia or Me-khong, the Salween, and the Irawadi, rising in the eastern parts of the high plateau, water the Indo-Chinese Peninsula. Rising on the same height, the Indus and the Brahmaputra flow through a high valley in opposite directions along the northern base of the Himalayas, until both pierce the gigantic ridge at its opposite ends, and find their way—the former to the lowlands of the Punjab, where it is joined by the Sutlej, and the latter to Assam and Bengal, where it joins the great river of India, the Ganges, before entering the Gulf of Bengal by a great number of branches forming an immense delta. The plateau of the Deccan is

watered by the Godavari and Krishna, flowing east, the Nerbada, flowing west, and a great number of smaller streams. The Tigris and Euphrates, both rising in the high plateau of Armenia, flow parallel to each other, bringing life to the valley of Mesopotamia, and join before entering the Persian Gulf. Arabia Proper has no rivers worthy of notice; only the *wadys*, or dry channels of former rivers, show that there was a time, not far distant, when it was well watered. The Irrmah, which enters the Black Sea, is the only river worthy of notice in Asia Minor. In Caucasus, the Rion and Kuban enter the Black Sea, and the Kura and Terek the Caspian.

Inland Seas, Lakes.—Numberless lakes are scattered all over Asia. A succession of great lakes, or rather inland seas, are situated all along the northern slope of the high plateaus of Western and Eastern Asia, their levels becoming higher as we advance farther east. The Caspian, 800 miles long and 270 wide, is an immense sea, much larger than the Black Sea, but its level is now 85 feet below the level of the ocean; Lake Aral, nearly as wide as the Egean Sea, has its level 157 feet above the ocean; farther east we have Lake Balkhash (780 feet), Zaisan (1200 feet), and Lake Baikal (1550 feet). Numberless smaller lakes and ponds, all rapidly drying up, break the surface of the steppes and lowlands of Siberia; while in the north, immense marshes cover the low grounds of Western Siberia. Many large lakes appear on the plateau of Tibet (Tengri-nor, Bakha) and on the high plateau of the Selenga and Vitim (Ubsa-nor, Tke-aral, Kosogol, Oron); and smaller lakes and ponds are so numerous that maps on a large scale are literally dotted with them. The same is true with regard to the plateau of the Deccan, Armenia, and Asia Minor. Three large lakes, Urmia, Van, and Goktcha, and many smaller ones, lie on the highest part of the Armenian plateau. On the Pacific slope of the great plateau, the great rivers of China and the Amur with its tributaries have along their lower courses some large and very many small lakes, which seem like reservoirs where the immense quantities of water carried down by these rivers during the summer rains is stored. The lakes Tun-tien, Po-yang, and Tai-hu, along the Yang-tse-kiang; those along the former course of the lower Hoang-ho; and Lakes Kizi and Hanka on the Amur and Usuri, as well as numberless smaller lakes, fall under this category.

Geology.—The time has not yet come when the geological history of Asia can be written in full. It appears, however, that the great plateaus, built up of crystalline unstratified rocks, granites, granites, syenites, and diorites, as well as of gneisses, talc, and mica-schists, clay-slates and limestones, which all belong to the Archean formation (Huronian, Laurentian, Silurian, and partly Devonian), have not been submerged by the sea since the Devonian epoch. The higher terrace of the plateau of Panir and the plateaus of the Selenga and Vitim are built up only of Huronian and Laurentian azoic schists; and even Silurian deposits—widely spread on the plains—are doubtful on the plateaus. Their upheaval dates from an earlier age, and they rose above the sea during the Devonian epoch, while parts, at least, of the lower terrace were under the sea at that period. During the Jurassic period, immense fresh-water basins covered the surface of those plateaus, and have left their traces in Jurassic coal-beds, which are found as well in the depressions of the plateaus as in those of the lowlands. Carboniferous deposits are met with in Turkestan, India, and Western Asia; while in Eastern Asia the numerous coal-beds of Manchuria, China, and the archipelagoes are all Jurassic. During the Cretaceous

and Tertiary period an immense mediterranean sea spread over the surface of the plateau, and penetrating through the Zungarian trench, it covered the Han-hai. This interior sea persisted until the earlier parts of the Tertiary epoch, when new upheavals broke its connection with the Tertiary seas which covered what are now plains and lowlands. Thick layers of Tertiary deposits, but mostly having the characters of coast deposits (conglomerates), are found at great heights in the alpine tracts which fringe the plateau. These chains of mountains are of the same ancient geological origin. They rose above the Carboniferous, Triassic, Chalk, and Jurassic seas which covered what are now the lowlands and lower terraces of Asia; but their upheaval has continued throughout these epochs, so that in the outer chains of Asia we see Carboniferous and younger deposits, up to Tertiary, lifted to great heights. It appears, however, that while the ancient upheavals dating from the azoic epoch had chiefly the direction from south-west to north-east, and were mainly due to granites, granitites, and syenites, the more recent upheavals of the Tertiary period have had a direction from north-west to south-east, and were due to augitic rocks, diorites, melaphyres, and so on. They modified, of course, to a great extent the *relief* of Asia, and raised to immense heights the Tertiary deposits, especially in the Himalayas.

What are now the lowlands of Asia must have been widely submerged by the seas of the Tertiary period, as also those of the Quaternary (postpliocene) period. The Tertiary sea of Eastern Asia was broken by chains of mountains into many separate parts, straits and lagoons, while that of Western Asia extended widely over what is now Southern Russia. The sea of the Quaternary period (glacial and post-glacial) no longer reached the plains of Central Asia, nor even the higher plains of Siberia. It covered the whole of the lowlands of North-western Siberia, as far as the 50th degree of latitude, a broad gulf probably connecting the Arctic Ocean with the Aral-Caspian Sea; but there are no traces of it on the high plains of Eastern Siberia, which were only intersected by several narrow elongated gulfs of the ocean. The moistness that thus ensued permitted glaciers (which are wanting now throughout the middle parts of Eastern Siberia and Mongolia) freely to accumulate, so that the whole of the upper plateau and its border-ridges were under a mighty ice-cap. Immense glaciers, like those of the Alps and Jura, covered also the alpine regions. How far glaciation extended over the plateau of Tibet and in China still remains unsettled. In Turkestan and Siberia, immense accumulations of loess fringe the alpine regions; while in China they cover immense tracts, and are the most fertile regions of Asia.

Many important changes in the distribution of land and water have been going on in Asia since the glacial period, and even during historic times. Since the Aral-Caspian Sea became isolated from the ocean, its desiccation, as well as that of the numberless lakes which dotted the surface of Asia during the Lacustrine (post-glacial) period, has proceeded with a rapidity which may be guessed from the very rapid rate at which the process has been observed to go on in Siberia during the last hundred years. All Asia bears unmistakable traces of having been covered during the Lacustrine period with numberless large and small lakes, which have now disappeared, not in consequence of the action of man, but in consequence of some general causes affecting the earth's surface since the last glacial period. The process is still more accelerated by the rapid upheaval of the continent—the whole of the

Arctic coast, as also most of that washed by the Pacific, the Mediterranean, the Red Sea, and parts of the Indian Ocean, being in a state of gradual elevation, while the few areas where traces of subsidence have been noticed are very limited. The influence of the desiccation of Asia has been felt even during historic times, and the migrations of the Ural-Altaians, Turks, and Mongols will probably be best explained if this change in the condition of Central Asia be taken into account; while the same circumstance explains the nearly desert state of those regions which were the cradle of European civilisation.

Volcanoes play an important part in Asia's geology; more than 120 active volcanoes are known in Asia, chiefly in the islands of the south-east, the Philippines, Japan, the Kuriles, and Kanchatka, and also in a few islands of the Sea of Bengal and Arabia, and of Western Asia. Numerous traces of volcanic eruptions are found, not only in the same regions, but also in Eastern Tian-shan, in the north-western border-ridges of the high Siberian plateau, and in the south-west of Aigun in Manchuria. Earthquakes are frequent, especially in Armenia, Turkestan, and around Lake Baikal.

Minerals.—Asia is exceedingly rich in a great variety of mineral products. There are gold mines of great wealth in the Urals, the Altai, and Eastern Siberia; and auriferous sands are found in Corea, Sumatra, Japan, and in the Caucasus Mountains. Silver is extracted in Siberia; platinum in the Urals; copper in Japan, India, and Siberia; tin in Banca; mercury in Japan. Iron ore is found in nearly all the mountainous regions, especially in Asia Minor, Persia, Turkestan, India, China, Japan, and Siberia; but iron mining is still at a rudimentary stage. Immense coal-beds are spread over China and the islands of the Pacific (Hainan, Japanese Archipelago, Sakhalin), Eastern Siberia, Turkestan, India, Persia, and Asia Minor. They cover no less than half a million square miles in China alone; but the extraction of coal is as yet very limited. Graphite of very high quality is found in the Sayans and Northern Siberia. The diamonds of India, the sapphires of Ceylon, the rubies of Burmah and Turkestan, the topazes, beryls, &c. of the Urals and Nertchinsk, have a wide repute. Layers of rock-salt are widely spread, and still more so the salt lakes and springs. The petroleum wells of the Caspian shores already rival those of the United States. Of other mineral products of less value which are used in modern industry, such as manganese, quartz sand, dyeing matters, and the like, there is no lack in Asia; and when modern industry shall spread over the great eastern continent, it will find at hand the best specimens and the greatest variety of mineral products, although it will have to vanquish the obstacles opposed to their extraction by the difficulties of access of the mountain tracts.

A variety of mineral springs, some of them equal to the best waters of Western Europe, are widely spread over Asia. Those of Caucasus and Transbaikalia already attract a number of patients.

Climate.—Even Eastern Europe has quite a continental climate. Still more continental is the climate throughout Asia, with the exception of a part of its coast regions. On account of the immense area of Asia, great differences of climate are met with, and therefore the meteorologists subdivide the continent into several climatic regions. (a) The province of Western Siberia, purely continental, is very cold in the winter and hot in summer. (b) Eastern Siberia is still more continental, colder in winter, and drier; it includes the pole of cold about Verkhoyansk, under 67° 34' N. lat., which

is the coldest spot of the Eastern Hemisphere; each wind, whatever its direction, brings to it a warmer air, and its average yearly temperature is no more than 2° F., while that of January is 56° below the freezing point of the Fahrenheit scale. See TEMPERATURE (TERRESTRIAL). (c) The Kamchatka province, receiving much more rain than the preceding, is moister and more genial. (d) The Chinese have a cold winter, and receive in the summer the periodical rains due to the monsoons; in Japan the climate is much the same, but more moderate. (e) The Central-Asian plateau is characterised by an exceedingly dry climate, with very cold winters, the cold being increased by its height above the sea-level. (f) The same exceeding dryness of climate is met with in the Aral-Caspian lowland, with its scanty rains and depressingly hot summer; and the same again is true with regard to (g) the Arabian region and Mesopotamia, which together may be considered as an eastern continuation of the Sahara. (h) The Mediterranean region, including Asia Minor, enjoys the best climate, reasonably moist, and more moderate in its extremes of temperature. (i) The valley of the Lower Indus, whose climate is dry and very hot, must be considered as a separate region; while (k) India, the Indo-Chinese Peninsula, and Australasia have a tropical climate, characterised by abundant periodical rains, especially in the summer, and a limited range of temperature. During the winter, Asia, as a whole, with the exception of India, the Indo-Chinese peninsula, and South-western Arabia, enjoys a temperature much lower than that of corresponding latitudes elsewhere; while in July, throughout all Asia, except on the coasts of the Kara Sea, Kamchatka, and the Manchurian littoral, the temperature is higher than under the same latitudes elsewhere.

The extreme cooling of North-eastern Asia during the winter results in a high pressure of air, which flows in January south, south-east, and south-west, resulting in N.W., N., and N.E. winds in Manchuria, China, India, and South-eastern Europe. In July, the barometrical minima in India, North-eastern Siberia, and Northern Manchuria result in S.W. and W. winds on the west coasts of India, and S. and S.E. winds in South-eastern Asia, while North-eastern Asia is under E.N.E., N.E., and E. winds.

It may be seen from the above how unequally the rainfall must be distributed over Asia. Thus, the Western Ghats of India, and the western slopes of the Assam Mountains, receive during the year no less than 98 inches of rain, which often falls in torrents. As a rule, the western coasts of India and the Indo-Chinese Peninsula, as also the valley of the Ganges, receive more than 75 inches of rain per year; while immense tracts of the Aral-Caspian depression, the Central-Asian plateau, Arabia, and Persia have less than 10 inches per year (no more than from 2 to 5 inches over Central Asia); and the remainder has from 10 to 25 inches with between 25 and 50 in Southern Siberia and Manchuria.

Flora.—When the traveller crosses the Ural and enters the lowlands of Western Siberia, he finds but little difference between the vegetation of the east of Europe and that of North-western Asia, and therefore the whole of Siberia, down to the 50th degree of latitude, has been included in one and the same domain of vegetation stretching from Scandinavia to the Pacific, across the northern half of the Old World. Only a narrow strip of land along the shores of the Arctic Ocean, where tree vegetation is represented only by two species of dwarf willows, 2 or 3 inches high, and by shrubs of the dwarf birch, is considered as a separate region—that of the *tundra* region, which extends

from the White Sea to the north-eastern extremity of Asia. It is the true domain of lichens and mosses, which clothe the deeply frozen ground; but in the few sheltered places where some soil has accumulated, we find hundreds of our common European flowering plants. The remainder of Siberia is included in the European-Asiatic boreal domain. Forests cover these extensive tracts, both in the hilly districts and in the marshy lowlands of Western Siberia, and they consist of the same trees (pine, fir, larch, cedar, silver fir, birch, aspen, and poplars) with which we are familiar in Europe. Only the red beech, which even in Middle Europe does not advance farther east than Poland, does not penetrate into Siberia; and the oak does not cross the Ural, reappearing only on the south-eastern slope of the great plateau. Besides, some conifers (larch, fir) show slight differences from their European congeners, which permit us to treat them as separate species. Nevertheless, the forests of Siberia differ widely from those of Europe in the predominance of the larch, the rarity of the Scotch fir, which grows only on the drier ground, and the very characters of the trees, compelled to accommodate themselves to a harsh climate, and to a soil either stony or swampy. The underwood of the Siberian forests also offers a richer variety of species, and many a bush, now a favourite in our gardens for its wealth of blossom (*Prunus baccata*, *Robinia caragana*, *Lonicera tatarica* and *cordata*, *Clematis*, *Rhododendron*), has its home in the alpine tracts which border the great plateau on the north-west. On the meadows which cover immense areas both on the lowlands and high plains, the vegetation, as a whole, differs but slightly from that of Eastern Europe; but it has a very different appearance, on account of the immense size reached by many grasses with hard, woody stems, and the brilliancy of their showy flowers. Peonies, aconites, gentians, asters, and the like, in the spring-time impart such a brightness to the meadows of the Baraba Steppe in Western Siberia, and still more of the high plains of Mimusinsk and Transbaikalia, as makes our European meadows appear exceedingly tame in comparison with those of Siberia. Corn grows freely throughout the region, except in places having a great altitude, where early frosts destroy the crops. Barley is cultivated even at Yakutsk, where it ripens rapidly during the hot summer, and under the greater amount of light received in these high latitudes. But fruit-trees, although they blossom every year, yield no fruits; the late May frosts nip their blossom.

This wide vegetation region, which occupies all Northern Asia, is bounded on the south by a line traced roughly from the Black Sea to Lake Baikal, and thence to the Upper Amur and the Sea of Okhotsk. It has not, however, the uniformity it may be supposed to have from a glance at a geo-botanic map. While the species freely spread from west to east on the lowlands of Siberia, they spread quite as easily from south-west to north-east, both along the high plains and the alpine regions which border the high plateau in the north-west, and over the plateau itself. Therefore, even the Siberian flora is easily subdivided into several separate regions. Thus we see the cedar-tree spreading all along the highest parts of the north-west border-ridge of the high plateau, from the Altai to the Lena; we find the same vegetation on the high plateau of the Kosogol and on the Vitim; the vegetation of the high plains of the Altai offers features common to that of the high plains west of Lake Baikal; and the Transbaikalian flora partakes of the characters of the Gobi. As soon as the Amur issues from the high plateau, we find on its banks the Chinese

and Japanese flora under the same latitudes as the purely Siberian flora in the west. Finally, it appears from recent investigations that even about Lake Balkhash and at the foot of the Tian-shan we have remainders of a European-Siberian flora, which has maintained itself on the better-watered slopes.

The next vegetation zone marked on our maps is that of the Steppes, which extends from the Steppes of South-eastern Russia over the Aral-Caspian depression and the middle parts of the high plateaus of Western and Eastern Asia, including several separate desert regions (the Han-hai, the Gobi, the dry interior parts of Arabia, Persia, and North-western India). This wide region ought to be divided in Central Asia alone into at least four sub-regions: the Aral-Caspian, the Tian-Shan, the Tibetan, and the Mongolian floras. The excessive dryness of climate gives to this region its characteristic aspect. Tree vegetation maintains itself only on the snow-covered mountains, which supply enough of moisture to the soil, while on the drier southern slopes, the Steppe vegetation climbs up to the limits of perennial snow. Only those bushes prosper which, like the Archa (*Juniperus pseudo-sabina*) and Saksaul (*Ammodendron*), have hardly any leaves, giving a dreary aspect to the Aral-Caspian Steppes and the base of the Tian-shan Mountains. The Steppes, the surface of the high plateau, and even (during the spring) the dry deserts, are covered with a rich carpet of nutritious grass. The grass of the Steppes is reduced to a few species: *Festuca*, *Stipa*, *Artemisia*, *Salsola*. In the dry regions of Arabia, the flora assumes a decidedly African character, owing to the presence of the gum-acacia and the date-palm.

The flora of the region to the east of the high plateau, including China, Manchuria, and Japan, must be considered as an East-Asiatic equivalent for the Mediterranean fauna of Europe. Oak reappears as soon as the eastern border-ridge of the plateau is crossed. So also the walnut, the hazel, the lime-tree, the maple; while several new species of poplars, willows, acacias, and many others, make their appearance. The forests, consisting of a most mixed vegetation, where southern species meet with northern ones, become really beautiful; in Japan a variety of species of pine, and the reappearance of the beech, add to their beauty. A rich underwood of lianas, ivies, wild vines, roses, and so on, renders the forests quite impassable, especially in the littoral region, which is submitted to the influence of the monsoons. In the lower parts, rich prairies cover immense spaces; the grass vegetation becomes luxuriant; and in the virgin prairies of the Amur, man and horse are easily concealed by the stems of grasses of gigantic size. Rice and cotton are cultivated in the southern parts of the region. The gradual disappearance of the southern species, and the prevalence of northern ones, permits the division of the region into two parts: the Chinese flora, and that of Manchuria and the Okhotsk littoral.

In Western Asia, the rich vegetation of the moister parts of Caucasus and the southern shores of the Caspian belongs to the Mediterranean flora of Europe. The beech is characteristic of the forests of this district, which besides contain all the trees of Southern Europe. The vine and several of our European fruit-trees (plum, cherry, apricot, pear) are regarded by botanists as belonging originally to this region. The flora of Asia Minor combines those of Southern Europe and Northern Africa, owing to its evergreen oaks, laurels, olive-trees, myrtles, oleanders, and pistachio-trees, as also to its variety of bulbous plants.

Southern and South-Eastern Asia, with their

numerous islands, display the richest flora, which seems quite distinct from the above, and extends as a separate domain of vegetation over India, the Indo-Chinese Peninsula, and the archipelagos, and (according to Drude) reaches North-western Australia. The hot climate, and the great amount of the summer rains, with a relatively dry winter, contribute to the development of a rich tropical vegetation. Thanks to the moisture of climate, the higher parts of the region, particularly the Himalayas, are clothed on their southern slopes with forests up to heights of 12,000 and 13,000 feet. The vegetation of the higher hilly tracts is very like the European. Numbers of plants growing on the Himalayan summits are common to all Arctic regions, showing thus the unity of flora of the Old World at its issue from the glacial period. Lower down, in the forest-girdle, pines, Scotch firs, juniper, and yew-trees are quite like their European congeners. The Indian cedar or 'deodar' yields an excellent timber, while in the underwood a remarkable variety of rhododendrons, growing sometimes 90 feet high, at heights about 8000 feet above the sea, are noteworthy.

In the lower parts of the region, and especially the neighbourhood of the seacoasts, the tropical vegetation reaches the variety and size of the American. Here the sugar-cane, the cotton-shrub, and the indigo had their origin. The cocoa-nut palm and the banyan-tree are the most striking feature of the coast vegetation. Ferns reach the size of large trees. The gigantic banyan, under whose branches hundreds of men can find a shelter, the screw-pine (*Pandanus*), the indianrubber, and the red cotton trees grow in immense forests; and bamboos grow thick and high.

In Borneo, Java, and the islands of the archipelagos, the tropical vegetation is, in its broad features, the same as in India. The mountain-flora also is like that of the Himalayas; rich forests clothe the volcanoes up to their tops. The sago-palm, the bread-tree, imported from the South Sea Islands, and the tamarind, also imported, are largely cultivated, as also the cocoa-nut palm and the sugar palm. Orchids appear in their full variety and beauty. The swamps are covered with mangroves, or with the anomalous-looking Nipa or Sasa palm; and vanilla, pepper, clove, and nearly all the spices are native to this region.

It is easy to see from the above what a variety of useful plants Asia has given to Europe. Wheat, barley, oats, and millet come from Western Asia; so also onions, radishes, peas, beans, spinach, and several other vegetables of our kitchen gardens. Nearly all our fruit trees have the same origin. The apple, pear, plum, cherry, almond, pistachio, and mulberry-tree were first cultivated in Asia; the raspberry and even lucerne have been imported from Asia to Europe.

Fauna. The fauna of nearly the whole of continental Asia is considered by zoologists as belonging to one single domain—that of Northern and Central Asia; and the immensity of this zoogeographical region is easily accounted for by the ease with which animals could spread over the plains of Europe and Siberia on the one side, and on the other, along the high plateau which stretches from Tibet to the land of the Tchukchis. But this wide region can be easily subdivided into the Arctic region, which shares its characters with Arctic regions generally: the boreal, embracing the lowlands of Western Siberia; the Daurian, in the northern parts of the great plateau; and the Central Asian. The fauna of Siberia is much like that of Eastern Europe, and would be still more like, were it not for the disappearance from Europe of several species still existing in Siberia. It is the true habitat of all

fur-bearing animals, as the bear, wolf, fox, sable, ermine, otter, beaver, common weasel, and squirrel; as also of the hare, the wild boar, the stag, the reindeer, and the elk, all belonging to the European faunas, with the addition of several species common to the Arctic fauna. In Eastern Siberia, however—i.e. in the northern parts of the high plateau—we find representatives of the fauna of Central Asia, which spread from the south-west (see SIBERIA). A further addition of Mongolian species is found on the lower plateau in Transbaikalia, where the fauna of the Central-Asian depression meets with that of Siberia.

The Central-Asian plateau has a fauna of its own; we find there the wild ancestors of several of our domestic animals—viz. the wild horse (*Equus Przewalski*), discovered by Przewalski (Prejevalsky) in the Altai Mountains, the wild camel and donkey, and the *Capra argalus*, from which our common goat is descended. The yak, several species of antelopes, and the roebuck are characteristic of the Central-Asian fauna; so also are the huge sheep (*Ovis argali* and *Ovis poli*), now disappearing, which found refuge in the wilder parts of the plateaus. In the Steppe region we find the same fauna as in Siberia, with the addition of the tiger, which occasionally reaches Lake Zaisan, and even Lake Baikal; the leopard and hyena, coming from warmer regions; and a variety of endemic birds; while in Arabia there is an admixture of African species.

The fauna of mammals in China, Manchuria, and Japan differs but little from the Siberian. The difference is mainly notable with regard to the birds, among which the pheasants are richly represented. Several Indian species also penetrate within this region. The Caucasus has a fauna belonging to the Circum-Mediterranean region, and it is worthy of notice that the bison, which has now completely disappeared from Europe (with the exception of the Byelovyezh forests in Western Russia), is still found in the forests of Caucasus; there we find also the same abundance of pheasants as on the Pacific littoral. The fauna of Asia Minor unquestionably belongs to the Circum-Mediterranean region, and includes—apart from the warm zone—viz. small apes, which spread from Africa into Persia, the porcupine of Southern Europe, and the Genet (q.v.).

Southern and South-eastern Asia belong to a separate zoological domain. The heights of the Himalayas have the fauna of the Tibet portion of the high plateau; but on their southern slopes the fauna is purely Indian and Transgangeitic, while a few African species are found on the plains of India and in the Deccan. As a whole, the tropical fauna of Asia is richer than the African, and the American tropical fauna surpasses it only in the number of parrots and the family of Picarie. It is characterised by the great number of carnivora, which find ready refuge in the jungles, and by the elephant, rhinoceros, wild buffalo, red deer, many long-armed apes and half-apes, vampires, genets, and a variety of serpents and crocodiles; while the bird fauna includes vultures, a variety of parrots, pelicans, and flamingoes. The fauna is still richer in the Indo-Chinese Peninsula, while in the archipelagos of South-eastern Asia several Australian species add to its extent.

The fauna of Asia, as of Europe, has undergone notable changes since the glacial period. The mammoth and hairy rhinoceros have disappeared, and their skeletons are buried in innumerable quantities in the great glacial deposits. So also the cave-bear, tiger, wolf, and hyena. Even within historic times, several species of mammals, like the bison and the aurochs, have all but disappeared, while others are found only in

very small numbers in the wildest parts of the high plateau.

Ethnography.—The aggregate population of Asia is estimated at 835 millions, being thus more than one-half of the entire population of the globe. In comparison with the total area of Asia, this population is nevertheless small, giving only an average of 49 inhabitants per sq. m. It is, however, very unequally distributed, and reaches 557 per sq. m. in some provinces of China—denser than in Belgium (514 per sq. m.)—and 470 in some parts of North-western India. As a rule, it is greatest in those parts of Asia which are most favoured by rains, the densest population being met with to the south and south-east of the great plateau, on an area comprising only one-fifth of Asia's surface. Seventenths have scarcely more than from 3 to 20 inhabitants per sq. m.; and nearly one-tenth is almost quite uninhabited.

Having been inhabited by man since the earliest period of the stone age, and having been moreover the theatre of so many migrations, Asia has but few human races free from mixture with other races. Nevertheless, the hindrance to mutual intercourse opposed by its mountains, and still more by its high plateaus and deserts, prevented the mingling of races and stems to such an extent as in Europe; therefore we find now in Asia the greatest variety of ethnological types and languages. And distinct stems in the less accessible tracts, numbering now but a few families, are sometimes the last remainders of great races. The work of classifying the immense variety of stocks inhabiting Asia according to their ethnological affinities and origin is being busily prosecuted by ethnographers and philologists, but is as yet far from being terminated.

The inhabitants of Asia belong to five different groups: the so-called Caucasian (Fair type) in Western Asia and India; the Mongolian in Central and Eastern Asia, as also in the Indo-Chinese Peninsula; the Malay in Malacca and the Indian Archipelago; the Dravidas in South-eastern India and Ceylon; and the Negritos and Papuas in the virgin forests of the Philippine Islands and Celebes. A sixth great division, comprising the stems which inhabit North-eastern Asia—the Hyperboreans whose affinities are not yet well known, must be added to the above. The Mongolian race alone embraces nearly seven-tenths of the population of Asia; the Malay, about two-tenths; and the Caucasian about one-tenth. The Europeans reckon about six millions (Russians) in Caucasus, Turkestan, and Siberia; some 150,000 (English) in India; and 45,000 in the Dutch Indies.

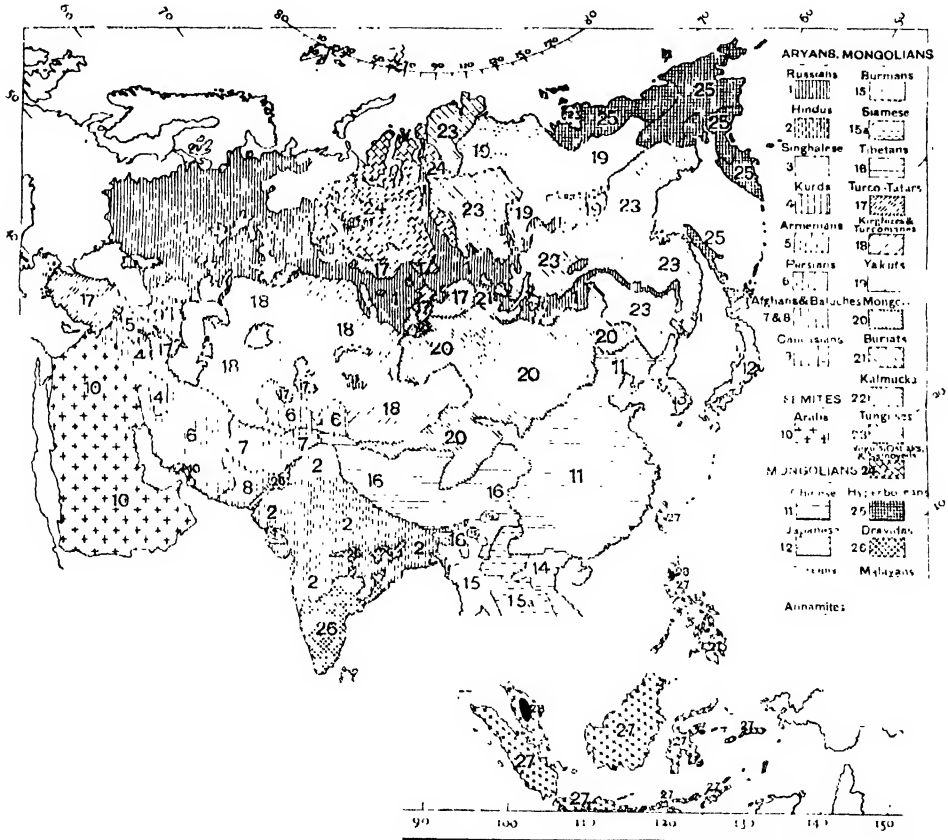
The further subdivision of the inhabitants of Asia, according to language, is as follows: The Caucasian race embraces (1) tribes and stems in Caucasus (Georgians, Lezghians, Circassians, &c.); (2) the Semitic branch, partly mixed with others, and subdivided into northern and southern; it comprises the Jews and the Arabs, who spread over Arabia, Mesopotamia, Syria, and partly over Africa; and (3) the Indo-Germanic branch, containing: (a) the Indians, whose language has, besides the Hindi, spoken in Central India, several dialects spoken in Kashmir and Punjab, the Hindustani or Urdu, the Sindhi, the Marathi, the Bengali, and Assami; and (b) the Iranians (Persians, Tajiks, and Zends, Afghans, as also the Kurds, the Armenians, and Ossetians). To these must be added the Russians and other Europeans.

The Mongolian race (Yellow type) is represented by four great branches, each of which comprises a great variety of stems (some very numerous, others composed only of rapidly disappearing tribes). These are: (1) the Ural-Altaians, or Finno-Tartars, subdivided in their turn into (a) the Samoyedic

tribes; (b) the Finnish stems; (c) the Turco-Tartars (Turks, Turcomans, Yakuts, Nogais, Djagutais, Uigur-Turks, and Kirghizes); (d) the Mongols, including the Mongols proper, the Buriats, and the Kalmycks; and (e) the Manchurians and Tunguses. The two other great branches belonging to the same subdivision of polysyllabic peoples are (2) the Japanese, and (3) the Koreans; while a fourth great branch includes (4) the nations speaking monosyllabic languages, namely: (a) the Chinese; (b) the Tibetans; (c) the Himalayan tribes; (d) the Burmese; (e) the Siamese; (f) the Annamese; and (g) the Sifars, Miautse, and several others.

The Hyperboreans, whose origin is not yet sufficiently known, are considered as quite separate from the above. They include: (1) the Yukaghirs, (2) the Teluktelis, and (3) the Koryaks and Kamchadales—all inhabiting the extreme north-east of Asia; and (4) the Ainos or Kurilians. The Yenisei Ostiaks and the Kotts are reckoned to belong to the same stock (see SIBERIA).

The Dravidian race, which formerly peopled all India, is now reduced to the mountain tracts of the interior and to Southern India, and is represented by (1) the Dravidas proper, including the Tamuls, Telingas, Canarese, and other smaller



Ethnographical Map of Asia.

stems; (2) the Kolarian tribes; and (3) the Singalese, whose language the Ehu must be considered, however, as quite separate.

The Malay race has three chief subdivisions: (1) the Malays proper; (2) the Polynesians; and (3) the Melanesians, who are a mixture of Malays with Papuas. All three are subdivided into a number of separate tribes (see MALAYS). The Negritos and Papuas are now found only in the less accessible forests of the interior of the peninsula of Malacca, and on the Philippine and Andaman Islands.

Religions. Since the dawn of history, Asia has been the birthplace of religions which spread all over the continent and the other parts of the world. The four great religions which are professed by the great majority of mankind—the Jewish, Buddhist,

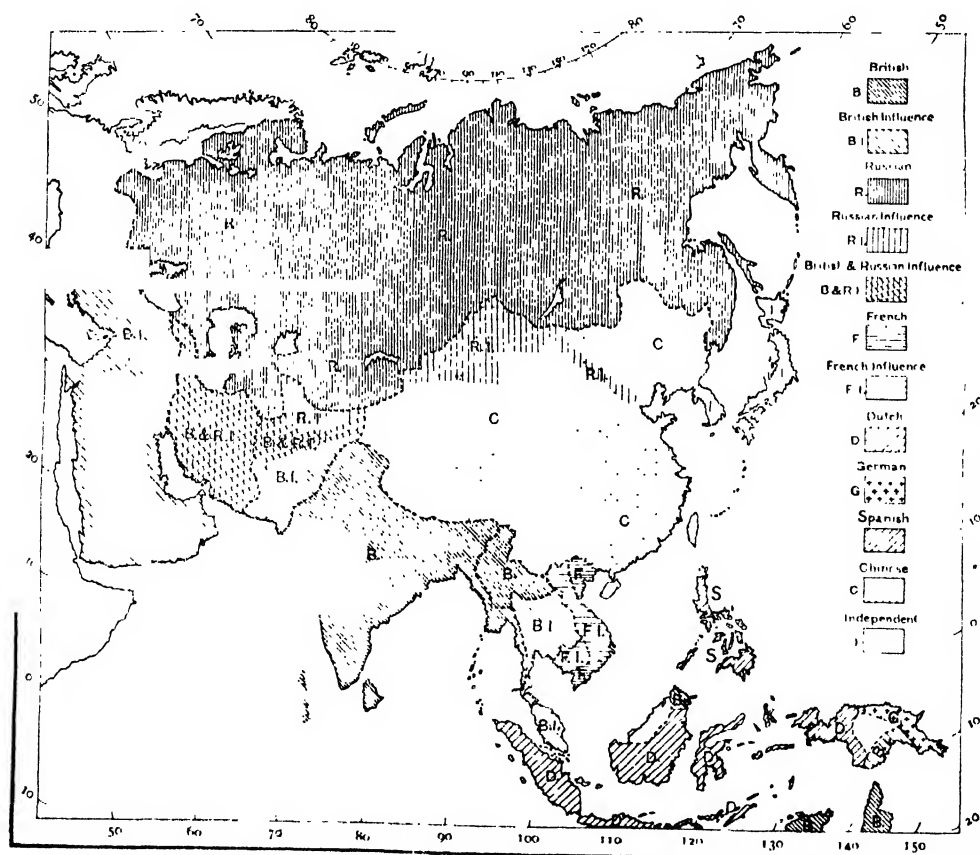
Christian, and Mohammedan—had their origin in Asia, where they grew up under the influence of still older religions—the Babylonian and that of Zoroaster—both also of Asiatic origin. Multitudes of new sects, or religions, mingled together, and exercising influence upon one another, are continually growing on the soil of Asia. At present the inhabitants of Asia belong chiefly to the Buddhist religion, which inclusive of the followers of Lamaism, the moral philosophy of Confucius, and the teachings of Lao-tse, who all accept more or less the Buddhist ritual has no less than 530 to 560 millions of followers, i.e. nearly one-third of mankind. The old faith of Hinduism has no less than 187 millions of followers in India. Most of the inhabitants of Western Asia, as also of part of Central Asia, follow the religion of

Islam; they may number about 90 millions. The Christians number about 20 millions in Armenia, Caucasus, Siberia, and Turkestan. Many of the Ural-Altaians continue to maintain their ancient faith—Shamanism—though a number of them are nominal followers of the Buddhist or Christian religions. Jews are scattered mostly in Western and Central Asia. A few fire-worshippers (Guebres or Parsi) who are found in the west of India and Persia are the sole remnant of the once wide-spread religion of Zoroaster; while vestiges of Sabæism are found amidst the Gesides and Sabians on the Tigris.

Civilisation.—Together with Egypt, Asia was the cradle of the present European civilisation; but, owing to many circumstances, partly physical and partly historical, the development of Asia proceeded on independent lines, and, as a whole, it may be considered as behind the civilisation of Europe. The current of civilisation, which formerly moved from Asia to Europe, returns now from west to east—unhappily, too often in its worst shape, that of conquest. Many a civilisation which grew up, either in South-western Asia or on the northern slope of the great plateau, has been swept away by invasions of less civilised hordes. At present one finds in Asia all varieties

of civilisation—the primitive tribes of North-eastern Siberia, the confederations of nomadic shepherds, and great nations in possession of a common stock of national customs, beliefs, and literature, like China; the tribal stage; the 'compound family,' forming the real basis of China's social organisation; the rural community, both of the Indian (also East European) and Mussulman type; the loose aggregations of Tehnukchis, having no rulers, and no religion beyond the worship of forces of nature, but professing with regard to one another principles of morality and mutual support often forgotten in higher stages of civilisation; and despotic monarchies, with a powerful clergy. So also in economic life. While the tribes of the north-east find their means of subsistence exclusively in fishing and hunting carried on with the simplest implements, among which stone weapons have not yet quite disappeared, and the tribes of Central Asia carry on primitive cattle-breeding and lead a half-nomadic life, others are agriculturists, and have brought irrigation (in Turkestan) to a degree of perfection hardly known in Europe.

Political Conditions. Viewed in its broad features, universal history appears as a long record of the mutual intercourse of Asia and Europe,



Distribution of the Continent amongst the Great Asiatic Powers.

and of struggle between them. While the countries beyond the great plateau entered but quite recently within the domain of western history, those on its Mediterranean slope have never ceased

to exercise a powerful influence on Europe. At the very dawn of written history—that is, forty centuries before our era—the great Accadian empire already influenced the inhabitants of the coasts of

the Mediterranean. Later on, the Phœnicians extended their authority over Northern Africa and the Ægean Sea; the Persians modified the development of Egypt; and at a very remote epoch, the date of which cannot be yet ascertained, an oasis of high civilisation, grown up at the base of the Altai Mountains, spread itself to the west over Northern Europe. On the other hand, as soon as Greece, which had borrowed her civilisation from Asia, brought it to so high a pitch as to become the cradle of European culture, she tried to extend her rule over the decaying empires of Western Asia. Alexander of Macedon pushed his conquests as far as Turkestan; and later on, Rome conquered Western Asia. But the Greek and Arabian civilisation in Central Asia decayed under the raids of Mongolian tribes; the Roman empire was absorbed by the East, and fell into decay at the very confines of Asia, on the shores of the Bosphorus; the Arsacides and Sassanides of Persia repulsed the Roman aggression and conquered Roman provinces, while it was to mass movements from Asia into Europe that the great migrations of the first centuries of our era were due. Ural-Altaians migrated to the Urals, and thence to Hungary. Other Turanians—the Mervs, the Mauns, the Avars—penetrated into Europe from the south-east; Mongols abandoned their rapidly desiccating plateaus, and invaded the Russian plains; the Arabs, following the south coast of the Mediterranean, invaded Spain; and the empire of the Osmanlis arose on the ruins of the Eastern Roman empire. By these invasions, Asia arrested the free development of Europe, and compelled the Germanic, Gallic, and Slavonic federations to gather into powerful states of the Roman monarchical type.

A new epoch in European history began after the development of European navigation, when Portuguese ships, rounding the Cape, founded the first European colonies in India. They were soon followed by the Spaniards, the Dutch, the French, the Danes, and the British, all endeavouring to seize the richest colonies in Asia, and all involved in interminable struggles for preponderance in her lands and on her seas; while Russia, in the course of a few centuries, conquered and partly colonised the best parts of the immense cold prairies and forest lands on the north-western slope of the high plateau, and crossing its narrow extremity in the north-east, reached the Pacific. Great Britain established herself in India, and expelling thence her competitors from all but a few spots on the sea-coast, she took possession of the whole of the peninsula, and extended her powers over the western parts of the Indo-Chinese Peninsula. The Portuguese retain in India only Diu, Damão, and Goa; and the French keep Chandernagore, Yancoon, Pondicherry, Caricall, and Mahé. The next colonial power in Asia is the Dutch, who have under their dominion most of Borneo, Sumatra, Java, Celebes, the Moluccas, and the small Sunda Islands. British and French interests are rivals in the Indo-Chinese Peninsula, and while Burmah has become English, the recent annexation of a part of Tonkin by France permits her to extend her influence in Annam. Finally, several islands of the South-east Archipelago belong to Spain. Leaving out these relatively small colonies, three great powers, Great Britain, Russia, and China, are the real masters of Asia, the last-named eastern empire opposing, by the number and cohesion of its inhabitants, a powerful resistance to the encroachments of European powers on its territory, and promising to become a formidable power, which may some day exercise a great influence on the destinies of mankind.

The chief political divisions of Asia, with their approximate areas and population (mostly

estimated) appear as follows. The territories belonging to European powers, or protected by them, are distinguished by abbreviations:

	Population	
RUSSIAN ASIA—		
Ca	182,500	6,534,850
Siberia (Russ.)	4,824,570	4,003,500
Transcaucasian Region (R)	230,400	206,000
Caspian Sea	169,670	
Turkestan (Russ.)	1,541,500	5,245,000
	6,948,640	16,079,350
WESTERN ASIA—		
Asiatic Turkey	729,700	16,133,000
Samos (trib. to Turkey)	210	41,200
Cyprus (British)	3,580	186,200
Independent Arabia	968,200	3,700,000
Aden and Perim (Brit.)	70	34,900
	1,701,260	20,095,300
IRAN AND T		
Persia (Russ. and Brit. prot.)	636,400	7,653,600
Alghem-tan (Br. and Russ. influence)	24	4,000,000
Kabulistan (Russ. and Brit. prot.)	20,000	1,000,000
Belmehistan (Brit. prot.)	106,800	350,000
Khiva (Russ. prot.)	22,300	70,000
Bokhara and Karategui (Russ. prot.)	92,300	2,130,000
	1,117,800	15,203,600
INDIA—		
British Territory	787,000	195,019,200
Feudatory States (Brit.)	509,730	55,192,000
Ceylon (Brit.)	25,300	2,850,000
French Possessions	195	282,700
Portuguese Possession	1,605	475,200
Himalaya States (Brit.)	89,600	3,300,000
	1,413,490	257,119,100
INDO-CHINESE PENINSULA—		
Wild tribes of Assam (Brit. prot.)	25,200	200,000
Lower Burmah (Brit.)	57,120	6,736,800
Upper Burmah (Brit.)		
Straits Settlements (Brit.)	1,130	540,000
Siam	80,050	6,000,000
Malacca States	31,500	300,000
Cochin China (Fr.)		
Tonkin (Fr.)		
Cambodia (Fr. prot.)		
Annam (Fr. prot.)		
	1,047,950	37,876,800
INDO-JAPAN—		
China Proper and Manchuria	560,540	355,000,000
Vassal States (Mongolia, Tibet, Zungaria, Eastern Turkestan)	2,519,300	9,200,000
Corea (Chin. prot.)	84,250	10,500,000
Hong-kong (Brit.)	32	160,400
Macao (Port.)	28	68,100
Japan	118,500	37,869,000
	4,112,410	412,797,500
SOUTH-EASTERN ASIA—		
Dutch East Indies	568,000	25,498,000
Philippines, Marianas, Caroline, and Sulu Archipelago (Span.)	116,240	5,681,000
East Timor, Ac. (Port.)	6,230	100,000
North Borneo and Labuan (Brit.)	27,550	181,300
Borneo States (Sarawak and Brunei)	62,910	450,000
	781,990	26,330,300
	17,417,700	334,251,900

Produce. The amount of cereals—rice, millet, wheat, barley, oats, &c.—supplied by the rich corn-fields of China, Indo-China, Japan, and even Turkestan, may be best judged by the density of population in the better-watered parts of these countries, and by the rapidly increasing amounts of corn exported, especially from India; while in Southern Siberia, the Altai, and the Middle Amur, Russian settlers raising wheat, rye, oats, barley, melons, &c. on the virgin soil of the *prairies* enjoy a welfare hardly known in Russia. The crops of cotton in India and Asia Minor helped Europe to meet the cotton crisis of 1863; and those of Bokhara and Transcaucasia gave an impulse to the growing cotton industry of Russia. Tea is the chief crop of Southern China, Assam, India, and Ceylon; and coffee the wealth of Arabia, India, Ceylon, and the Dutch colonies. The silkworm culture is widely spread in Asia Minor, Persia, Turkestan, India, China, and Japan. The sugarcane is largely raised in Southern and South-

eastern Asia. Oleaginous plants, indigo and other dye plants, jute, spices, the cinchona-tree, and opium-producing plants are extensively cultivated; as also fruit-trees in Western Asia and Turkestan. The cocoa-palm, the bread-tree, the gutta-percha tree, and the like are also grown to a great extent in tropical Asia, while many of our most valuable species of timber came originally from Asia, and are still imported thence to Europe.

On the steppes and plateaus of interior Asia, numberless herds of horses, horned cattle, and sheep furnish all the necessities of life to the nomad or half-nomad Mongolian inhabitants of these regions, and supply the European trade with a yearly increasing amount of hides, wool, and tallow. The forests of the far north and north-east afford the means of existence to nomad hunters, who find, however, severe competitors in the Siberian (Russian) peasants. Both supply the trade with rich furs; while the rivers of Siberia and Manchuria provide food for the nomad Ostiaks, Gols, and Ghil-yaks. And finally, the Behring and Okhotsk Seas of the Northern Pacific, and their islands, supply the civilised world with some of the finest furs.

Ways of Communication. The plateaus, the deserts, and the mountainous regions of Asia, thickly clothed with impenetrable forests and intersected by deep gorges and valleys, are so many obstacles to the communication between different parts of the continent. The roads of Asia, except those of China and India, and a few main lines elsewhere, are mostly mere footpaths or tracks marked in the deserts, with wells far apart, and bleached with the bones of camels. Caravans of camels are therefore the chief means of transport for goods and travellers in the interior: donkeys, yaks, and even goats and sheep are employed in crossing the high passes of the mountains; horses are the usual means of transport in most parts of China and Siberia, and in the barren tracts of the north the reindeer, and still further north the dog, are made use of. Fortunately, the great rivers of Asia provide water communication over immense distances. The deep and broad streams of China, allowing heavy boats to penetrate far into the interior of the country, connect it with the sea; a brisk traffic is carried on along these arteries. In Siberia, the bifurcated rivers supply a water-way not only north and south along the course of the chief rivers running towards the Arctic Ocean, but also west and east; thus a great line of water communication crosses Siberia, and is, with but a few interruptions, continued in the east by the Amur, navigable for more than 2000 miles. In the winter the rivers and plains of Siberia become excellent roads for sledges, on which goods are still chiefly transported.

Railways are only beginning to make their appearance in Asia. In India they already represent a total length of 16,650 miles. Russia, too, has spread her railways far into Asia; a military line now connects the Caspian Sea with Merv, and Merv with Tchardjui on the Amu-daria, and it will be continued towards Samarkand. In the north, Perm, the terminus of steamer navigation the Kama (tributary to the Volga), is connected by rail across the Urals with Tyumen, whence steamers ply to Tomsk, in the very heart of Siberia, and to Barnaul, in the Altai. It is proposed to connect Tomsk by rail with Lake Baikal and Tchita, or 'Sryetensk' on the Shilka, whence steamers ply to Nikolayevsk, on the Pacific. Finally, China decided in 1886 to open its territory to railway-construction. A brisk traffic is carried on along the shores of Asia, all its chief ports in the south and south-east being already in regular steam communication with Europe and the United States. With regard to the much-discussed northern route

from Europe to Siberia, *via* the Kara Sea and Arctic Ocean, Nordenskjöld's circumnavigation of Asia and the numerous attempts of the last few years have proved it possible; but they have shown also the difficulties in the way of regular traffic.

Telegraph communications are in a much more advanced state than the roads. St Petersburg is connected by telegraph with the mouth of the Amur and Vladivostok (on the frontier of Corea); while another branch, crossing Turkestan and Mongolia, runs on to Tashkend, Peking, and Shanghai. Constantinople is connected with Bombay, Madras, Singapore, Saigon, Hong-Kong, and Nagasaki in Japan; and Singapore stands in telegraphic communication with Java, and Port Darwin in Australia. Finally, Odessa is connected by wire with Tiflis in Caucasus, Teheran, and Bombay.

Trade. Notwithstanding the difficulties of communication, a brisk trade is carried on between the different parts of Asia, but there is no possibility of arriving at even an approximate estimate of its aggregate value. The maritime exports to Europe, the United States, and overland to Russia, reached, in 1885-86, a value of nearly £175,000,000, and the imports about £125,000,000.

Hitherto Asia has supplied Europe chiefly with raw materials: gold, silver, petroleum, teak and a variety of timber-wood, furs, raw cotton, silk, wool, tallow, and so on; with the products of her tea, coffee, and spice plantations; and with a yearly increasing amount of wheat and other grain. Steam-industry is only now making its appearance in Asia, and, although but a very few years old, it threatens to become a rival to European manufacture. Indian cottons of European patterns and jute-stuffs already compete with those of Lancashire and Dundee. Several of the petty trades carried on in India, China, Japan, Asia Minor, and some parts of Persia, have been brought to so high a perfection that the silks, printed cottons, carpets, jewelry, and cutlery of particular districts far surpass in their artistic taste many like productions of Europe. The export of these articles is steadily increasing, and Japan supplies Europe with thousands of small articles, applications of Japanese art and taste to objects of European household furniture.

Asia, CENTRAL. This term is generally, in its geographical sense, used of the region lying between the Altai Mountains and the Persian Gulf, and includes part of Siberia, all Turkestan, Afghanistan, Beluchistan, and part of Persia. An earlier usage—that of Humboldt—gave this name to the khanates of Bokhara and Independent Tartary. In Russian official language, Central Asia is an administrative division of the empire lying to the SW. of Siberia, and comprising, with part of what used to be called Siberia, the recent Russian annexations in Turkestan. Russian Central Asia is divided into the governments of Akmolinsk, Semipalatinsk, Turgai, Ural'sk, Semirechinsk, Sir-dar'ya, Zhetysay, Amu-daria, the Trans-Caspian territory, and Ferghana. The total area is given at 1,201,000 sq. m., and the pop. at 4,390,000. For the physical geography of the region, see ASIA; see also TURKESAN, SIBERIA, KHOKAND, &c.

Asia Minor (Asia the Less, as distinguished from Asia in the widest extent) is the name usually given to the western peninsular projection of Asia, forming part of Turkey in Asia. The name is not very ancient; originally the Greeks seem by Asia to have meant only the western part of Asia Minor, but with their geographical knowledge, the scope of the name Asia gradually widened. The late Greek name for Asia Minor is Anatolia (q.v.). *Anatolé*, 'the East,' whence is formed the Turkish

Anatoli. Asia Minor includes the peninsula: the eastern boundary, somewhat artificial, being a line from the Gulf of Skanderoun to the Upper Euphrates, and thence to a point east of Trebizond. The area of the peninsula exceeds 220,000 sq. m. It constitutes the western prolongation of the high tableland of Armenia, with its border mountain-ranges. The interior consists of a great plateau, or rather series of plateaus, rising in gradation from 3500 to 4000 feet, with bare steppes, salt plains, marshes and lakes; the structure is volcanic, and there are several conical mountains, one of which, the Ergish dagh (Argens), with two craters, attains a height of 11,830 feet, towering above the plain of Kaisariéh, which has itself an elevation of between 2000 and 3000 feet. The plateau is bordered on the north by a long train of parallel mountains, 4000 to 6000 feet high, and cut up into groups by cross valleys. These mountains sink abruptly down on the north side to a narrow strip of coast; their slopes towards the interior are gentler and bare of wood. Similar is the character of the border ranges on the south, the ancient Taurus, only that they are more continuous and higher, being, to the north of the Bay of Skanderoun, 10,000 to 12,000 feet, and farther to the west, 8000 to 9000 feet. The west border is intersected by numerous valleys opening upon the Archipelago, to the northern part of which Mounts Ida and Olympus belong. Between the highlands and the sea lie the fertile coast-lands of the Levant. Of the rivers the largest is the Kizil Irmak (Halys), which, like the Yesil Irmak (Iris), and the Sakaria (Sangarius), flows into the Black Sea; the Sarabat (Hermus) and Meander (Mæander) flow into the Egean. See ASIA.

The *climate* has on the whole a south-European character; but a distinction must be made of four regions. The central plateau, nearly destitute of wood and water, has a hot climate in summer, and a cold in winter; the south coast has mild winters and scorching summers; while on the east of the Egean there is the mildest of climates and a magnificent vegetation. On the north side the climate is not so mild, but the vegetation is most luxuriant.

In point of natural history, Asia Minor forms the transition from the continental character of the East to the maritime character of the West. The forest-trees and cultivated plants of Europe are seen mingled with the forms characteristic of Persia and Syria. The central plateau, which is barren, has the character of an Asiatic steppe, more adapted for the flocks and herds of nomadic tribes than for agriculture; while the coasts, rich in all European products, fine fruits, olives, wine, and silk, have quite the character of the south of Europe, which on the warmer and drier south coast shades into that of Africa.

The inhabitants, some 7,000,000 in number, consist of the most various races. The dominant race are the Osmanli Turks, who number about 1,200,000, and are spread over the whole country; allied to these are the Turkomans and Yuruks, speaking a dialect of the same language. The latter are found chiefly on the tableland, leading a nomadic life; there are also hordes of nomadic Kurds. Among the mountains east of Trebizond are the robber tribes of the Lazcs.

The Greeks and Armenians are the most progressive elements in the population, and have most of the trade; while the Greeks monopolise the professions, the ownership of the land is largely passing into the hands of Greeks, Armenians, and Jews. Administratively the country falls into eight vilayets or governments, with their capitals in Bursa, Smyrna, Konieh (Iconium), Adana, Sivas, Angora, Trebizond, and Kastamuni respectively.

In ancient times the divisions were Pontus, Paphlagonia, Bithynia, in the north; Mysia, Lydia, Caria, in the west; Pisidia with Pamphylia, and Cappadocia, in the south; and Galatia with Lycæonia, and Phrygia, in the centre. The Turkish islands of the Archipelago belong, most of them, to Asia Minor.

Here, especially in Ionia, was the early seat of Grecian civilisation, and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, &c., with Troy, Ephesus, Smyrna, and many other great and famous cities. Here, from the obscure era of Semiramis (about 2000 years B.C.), to the time of Osman (about 1300 A.D.), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians; of the Romans with Mithridates and the Parthians; of the Arabs, Seljuks, Mongols, and Osmanli Turks with the weak Byzantine empire. Here Alexander the Great and the Romans successively contended for the mastery of the civilised world. But, notwithstanding all these wars, the country still continued to enjoy some measure of prosperity till it fell into the hands of the Turks, under whose military despotism its ancient civilisation has been sadly brought to ruin. Recently, considerable portions of Armenia, in some respects part of the peninsula, have been absorbed by Russia. During the treaty negotiations between Russia, Turkey, and the Powers, after the war of 1877, Great Britain made a secret engagement to guarantee against Russian aggression the Asiatic dominions of the Porte, and to assume an indefinite protectorate over Asia Minor.

Asiago, a town of North Italy, 22 miles N. of Vicenza, on a ridge. Pop. (1881) 2016. The surrounding district is known as the Sette Comuni (q.v.).

Asiatic Society. ROYAL, was founded in London in 1823 by several noblemen and gentlemen interested in India and China, for the investigation and encouragement of arts, science, and literature in relation to Asia. The Literary Society of Bombay and Madras, and the Asiatic Society of Ceylon, with that of China at Hong-Kong, are declared to be branch societies of the Royal Asiatic. The Transactions of this society contain many important articles on eastern literature, religion, philosophy, &c. There is a museum and library, the latter being rich in oriental MSS. and Chinese books.

Asinius. See POLLIO.

Asirgarh (also *Asceghur*), a strong fortress in the Central Provinces, 300 miles N.E. of Bombay. It stands on an isolated mountain of the Satpura range, 850 feet above the base, and has been twice taken by the British in 1803 and 1819.

Askabad, a town of Russian Turkestan, the political centre of Trans-Caspia, situated on the Trans-Caspian Railway, 290 miles S.E. of Mikhailovsk, the seaward terminus, and 232 W.N.W. of Merv. It was occupied by the Russians in 1881.

Aske, ROBERT. See PILGRIMAGE OF GRACE.

Askew, ANNE. Protestant martyr, was born of gentle parentage near Grimsby, Lincolnshire, in 1521. Early embracing the views of the Reformers, she was turned out of doors by her husband, a zealous Roman Catholic. On this she went up to London to sue for a separation; but in 1545 she was arrested on a charge of heresy, and was examined by the Bishop of London and others on the doctrine of transubstantiation. After further examination and torture by the rack, she was burned at the stake, in Smithfield, July 18, 1546.

Askja (Ice., 'basket'), the largest volcano in Iceland, rises out of the vast Odálthraun lava-desert, near the centre of the island, in 65° N. lat. and 16° 45' W. long. Its vast crater is over 23 sq. m. in area, and about 17 miles in circumference. Almost circular in shape, it lies at a depth of over 700 feet within a mountain built up, by a distinctly marked series of lava flows, round a volcanic vent, to a height of 4633 feet above the sea. Great volumes of steam are belched forth from numerous rifts and vents, and the whole surface is a chaos of rugged lava-floods, except in the SE., where there is a hot-water lake 5 miles in circumference, and a tract covered with pumice ejected in 1875. This great eruption first called general attention to Askja, and it has been stated that the volcano was only then formed; but the traces of innumerable earlier eruptions are found in the walls of the crater, already referred to, where the divisions are marked by the layers of red, slag-like lava, which time after time has formed the surface of the underlying lava strata. Most of the lava in this eruption found an outlet, not from the crater, but some miles to the NE., where a bed, 20 miles long and 7 broad, now lies.

Asklepios. See ESCULAPIUS.

Asmode'us, or ASMO'DEUS (Heb. *Asmodai*, 'the destroyer'), a demon mentioned in the later Jewish writings. In the Book of Tobit, he is described as loving Sara, daughter of Raguel, and as having, in the form of a succubus, destroyed in succession her seven husbands; hence, in modern times, he is jocularly spoken of as the destroying demon of matrimonial happiness. In the Talmud, Asmodeus is described as the prince of demons, and is said to have driven Solomon from his kingdom. His real origin may perhaps be traced to the *Eshma dazra*, one of the evil demons of the ancient Persian religion. Le Sage has given him a permanent place in literature by his novel, *Le Diable Boiteux*.

Asmode'aus. See MACCABEUS.

Aso'ca (*Juncea asoca*), an Indian tree of the natural order Leguminosæ, sub-order Cesalpinieæ, remarkable for the beauty of its red and orange flowers. The leaves are abruptly pinnate, shining, and very beautiful. The asoca is often mentioned in Indian poetry, and is connected also in various ways with the Hindu mythology.

Asoka, an Indian King, has been called the 'Buddhist Constantine,' having organised Buddhism as the state religion. He was the grandson of Chandragupta or Sandrocottus (q.v.). He began to reign in 264 B.C. As king of Magadha or Behar, Asoka became a zealous convert to Buddhism about 257 B.C., and in 244 he convened the third of the great Buddhist councils at Patna. Throughout his kingdom and the conquered provinces he published the grand principles of the faith; and the fourteen edicts by which these sermons were preached are still found graven deep on pillars, caves, and rocks from Peshawar and Kathiawar to Orissa. About 40 such rock inscriptions in the Indo-Bactrian character (see ALPH. BET.) are still extant; but he is said to have erected 84,000 memorial columns. He regarded proselytism by peaceful means as a state duty. His civil organisation and administration of justice were also admirable. The probable date of his death is 223 B.C.

Asp (Gr. *aspis*), a popular name, applied loosely both in the English and Greek form to various genera of venomous serpents. (1) It is often now applied to the *Vipera aspis* of Southern Europe, which closely resembles the common viper. Several other species of *Vipera* have received the same popular name. (2) Cleopatra's asp, to which allu-

sion is so often made, was most probably the small *Vipera husselquistii* or horned viper. (3) It is equally impossible and unnecessary to determine with certainty the exact significance of the biblical word 'asp.' Several species of vipers occur in Palestine, but the context would in some cases suggest the Egyptian juggler's snake, *Naja haje*. (4) Another form, which is nearly allied to the Indian cobra de capello (*Naja tripudians*), is, like the latter, very venomous, and has also the habit of dilating the loose skin of its neck. It has been long known, and seems to be often referred to under the titles *aspis*, *aspie*, and *asp*.

Asparagine, $C_4H_8NH_2 \begin{Bmatrix} CONH_2 \\ COOH \end{Bmatrix} + 2H_2O$, is a crystalline substance which exists ready formed in common asparagus, marsh-mallow, potatoes, chestnuts, liquorice-root, and the young shoots of peas, beans, &c. It is readily obtained from the expressed juice of the young shoots of asparagus, which, after filtration and evaporation to a syrup, soon deposits it in crystalline prisms of a right rhombic form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste, and a slight acid reaction. From a chemical point of view, asparagine is regarded as the Amide (q.v.) of aspartic acid, and forms compounds with acids and alkalis.

Asparagus, a genus of Liliaceæ; it contains sixty to seventy species, usually herbaceous, but sometimes shrubby or climbing; the stem is unarmed in some, in others thorny; the young shoots covered with leaf-scales, afterwards very much branched, with numerous fasciculate, generally bristle-like 'leaves,' which are really abortive branches or flower-stalks, the true leaves being



Asparagus:

a, tip; end of a stem, showing leaves, &c.; b, young shoot.

reduced to minute scales. The most widely diffused species is the Common Asparagus (*A. officinalis*), a native of Europe, which grows on the banks of rivers and on the sea-shore, in meadows and bushy places, especially in sandy soils, occurring wild in a few places in Britain, and which is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, form a much esteemed article of food, which, however, is only in a slight degree nutritious. These sprouts contain a peculiar crystalline substance, called *Asparagine*, and have a specific action on the urinary organs, so that their long-continued use in very large quantities is apt even

to produce bloody urine. They are no longer retained in the pharmacopœia, but both the shoots and the roots of asparagus are still occasionally used as a diuretic in dropsies, and as a lithic to dissolve urinary calculi. For these purposes, the root is preferred, and is administered in the form of an infusion or decoction.—The thick and tender kinds of asparagus are most esteemed for the table. By cultivation it is much increased in size, and considerably altered in general appearance. In its wild state it is seldom more than a foot high, and not much thicker than a goose-quill; whereas it can be obtained in gardens more than half an inch in diameter, while its stems may rise to the height of four or five feet. Asparagus was a favourite vegetable of the ancient Romans. It is raised from seed, and grows best in a rich, fresh, sandy soil. The seed is generally sown in spring, either in the prepared bed, or in drills, from which the shoots may be transplanted when one year old. In England, it is generally planted in rows, at distances varying from 1 foot to 2½ feet, in beds that have been previously prepared by deep trenching (usually 2½ to 3 feet) and rich manuring. The shoots should not be cut till the second year after planting, and then very sparingly at first. Litter or vegetable mould is spread over the bed in autumn. It is allowed to occupy the same ground for many years; well-made beds continuing in a good bearing condition for twenty years or more. Asparagus is grown more extensively in France, where large quantities are raised among the vines. The French method differs chiefly in the substitution of more surface manuring for the English practice of preparing and enriching the bottoms of the beds. The seeds have been used as a substitute for coffee, and a kind of spirit has been made from the fermented berries. The young shoots of several other species are also eaten, as those of *A. tenuifolius*, *A. acutifolius*, and *A. albus*, natives of the south of Europe; the last of which is used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the Bitter Asparagus (*A. scaber*), which is very similar to the Common Asparagus, are uneatable on account of their great bitterness.

Asparagus Stone. See APATITE.

Aspa'sia, one of the most remarkable women of antiquity, was born at Miletus. The circumstance that in Athens marriage with foreign women was illegal, has originated the erroneous notion that Aspasia was a courtesan. She certainly broke through the restraint which confined Athenian matrons to the seclusion of their own homes; for after her union with Pericles, who had parted from his first wife by mutual consent, her house became the rendezvous of all the learned and distinguished people in Athens. Socrates often visited her. Her beauty, varied accomplishments, and political insight were extraordinarily great. From the comic writers and others she received much injustice. Hermippus, the comic poet, took advantage of a temporary irritation of the Athenians against Pericles, to accuse Aspasia of impiety; but the eloquence of the great statesman procured her acquittal. Her influence over Pericles must have been singularly great, and was often caricatured. Aristophanes ascribing to her both the Samian and the Peloponnesian wars, the latter on account of the robbery of a favourite maid of hers. Plutarch vindicates her against such accusations. Her son by Pericles was allowed to assume his father's name. After the death of Pericles (429 B.C.), Aspasia formed a union with Cysicles, a wealthy cattle-dealer, who, through her influence, became an eminent man in Athens.

Aspe, a romantic valley in the Western Pyrenees, close to the Spanish frontier. It has a population of 12,000, and was formerly a republic under the protection of the princes of Bearn.—ASPE is also a town of Valencia, Spain, in the province of Alicante, with a trade in ore and wine. Pop. (1878) 7476.

Aspects, in Astronomy, are certain positions of planets with respect to one another, as seen from the earth. In the days of astrology, there were five Aspects—Conjunction (indicated by the symbol ☿), Sextile (♊), Quartile (♋), Trine (♌), Opposition (♍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile, when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these aspects great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition*. These, the former especially, were often not reckoned as aspects.

Aspen, or TREMULOUS POPLAR (*Populus tremula*; see POPLAR), a tree which grows plentifully in Europe and in Siberia. It is a native of Britain, and is frequently found in Scotland, where it is met with even at an elevation of 1500 feet above the sea. It has received the specific name *tremula*, from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind, a property for which, indeed, the aspen-leaf has become proverbial. The leaves are



Branch of Aspen (*Populus tremula*): a, catkin.

nearly orbicular, but broadly toothed, so as almost to exhibit angles. The footstalks are long, slender, and compressed, which favours the readiness of motion. It grows quickly, with a straight stem, reaching to a height of from 60 to 80, or even 100 feet. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning lathe, and especially for being made into troughs, trays, and pails; whilst in France it is used for sabots. If the stem be peeled and allowed to dry before it be cut down, the wood becomes harder, and is then capable of being used as timber for the interior of houses; and on this account the tree is of great importance in many districts, and the more so as it succeeds in any soil, although it prefers one which is moist and gravelly. The bark contains a great quantity of a bitter alkaloid, *salicin*. The charcoal made from this tree can be used in the manufacture of gunpowder. The peculiar quivering of the leaves of the aspen has given origin to a wealth of legendary and literary associations with the tree. The old legend that it supplied the wood of the Cross, and has never since ceased to tremble, is even yet quoted as the cause of its ceaseless quivering. It appears to have been highly valued as a timber tree in the time of Henry V., particularly for the making of

arrows. An act of parliament was passed in that reign preventing the consumption of the *aspe* for any other purpose, under a penalty of a hundred shillings. This act was only repealed in the reign of James I.—*Populus tremuloides*, a very similar species, a native of North America, is called the American aspen. It is regarded by some as a mere variety. Very similar, also, is another North American species, *P. grandidentata*.

Aspergillum, a remarkable genus of boring Lamellibranch Molluscs, in which the shell has the form of an elongated cone, terminating at the lower end in a disc, pierced by numerous small tubular holes. The appearance of the disc suggests the rose of a watering-pot, and this has given rise to the popular ('Watering-pot') and technical names. The tube itself is secreted by the siphons through which the water passes in and out. The two minute valves of the young mollusc persist near the lower end of the tube. Similar rudimentary shells are exhibited by allied genera, in the family *Gastrochorda*, and by the fossil *Teredina*, which bored the drift-wood of the London clay.



Aspergillum
a, the disc with holes;
b, the rudimentary
valves.

Aspergillus is the name of a genus of minute fungi or Moulds (q.v.) occurring on decaying substances of various kinds. *Aspergillus* and *Aspergillum* are both late Latin words (from *aspergere*, 'to sprinkle') for the brush used in the Roman Catholic Church for sprinkling holy water on the people.

Aspern, a small village of Austria, on the left bank of the Danube, nearly opposite Vienna. It was the scene of a sanguinary battle on 21st and 22d May 1809, between the French under Napoleon and the Austrians under Archduke Charles, the French being defeated, after terrible slaughter, on the second day. The loss of the Austrians was 24,000; of the French, 30,000.

Asperula. See WOODRUFF.

Asphalt, ASPHALTUM, or MINERAL PITCH, is the name given to a compact form of bitumen, which is usually black or dark-brown in colour. When free from earthy impurities, it has a conchoidal fracture and resinous lustre. Asphalt is generally found wherever rock-oil occurs, and in such localities it is clearly produced by the drying up of the petroleum. In some places, however, it occurs in beds forming a compact rock. The Dead Sea, the district near Babylon, some of the West Indian Islands, notably the *Pitch Lake* in Trinidad, and one or two places in France, Switzerland, and Dalmatia, are the best-known localities for this substance; but it is found, more or less, in a great many countries. Asphalt was employed by the ancient Egyptians for embalming their dead, and it was used in Babylon as mortar. Its modern applications are numerous. It is an ingredient in Japan varnish, and is used along with other materials to make waterproof roofing and flooring, linings for cisterns, and along with pasteboard material in the construction of water-pipes. It is much used to form what are called 'damp courses' in walls of buildings—that is, a layer of it, from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch thick, is spread over the thickness of a wall near the ground-level, to prevent the ascent of damp. Frequently nowadays the whole internal area of a house is covered with a layer of asphalt. In cases where the wall of a house comes against a bank of earth, the whole

surface is protected from damp by a lining of this material. One or two kinds, such as those found at Seyssel in the east of France, and at Val-de-Travers in Switzerland, though called asphalts, are really bituminous limestones. The latter is known all over the world as a material for pavement. This Val-de-Travers asphalt is prepared by reducing the natural rock, which contains from 7 to 20 per cent. of bitumen, to powder, and then putting it with a small quantity of melted bitumen into a caldron. After it is fused and stirred for some time, it is run into moulds to form blocks of about 1 cwt. each. These blocks are called 'asphaltic mastic,' and the finest kinds contain 87 per cent. of carbonate of lime and 13 of bitumen. This mastic should not melt below 168° F. It has, especially since 1854, been very extensively employed in the construction of pavements. When this material is used, there is, of course, far less noise produced by the traffic on the streets than with stone. For paving purposes, the 'asphaltic mastic' is heated in portable boilers, into which, at a certain stage of the preparation, there is poured about 25 per cent. of thoroughly dried sand, gravel, or powdered limestone, which is well mixed with the liquid asphalt. The mixture is then spread on the spot prepared for it, and when cool forms a hard kind of pavement. In Paris, both for carriage-ways and foot-pavements, it has been largely employed for more than thirty years, having been introduced by Napoleon III. with a view, it is said, to prevent the erection of barricades with paving-stones. In more recent times it has been extensively used in Berlin, and many other continental towns, for the same purposes. In London and other parts of Great Britain, foot-pavements are still frequently made of it, but it has been but very partially used for carriage-ways. For this last purpose the moist climate of our island probably renders it more slippery than on the Continent. Pavements formed of an artificial or coal-tar asphalt have long been, to a limited extent, in use; but this material is not so suitable for them as the natural asphalts (see GAS-TAR). It is well to state, however, that artificial asphalt is more used for 'damp courses' than the asphalts from bituminous limestones, although the latter are much better. Of late years, an asphalt made of coal-tar pitch and a cheap mineral oil called creosote oil, has been much used for the joints of wood-pavement and causeway stones, and does very well. The pigment known as asphaltum is sometimes prepared from natural asphalt, but more frequently from the residue of distilled bituminous substances. Unfortunately, its fine transparent brown colour has tempted some distinguished modern artists to use it largely. Through its property of not drying thoroughly and free of cracks, a number of fine pictures painted some years ago by Horace Vernet, Sir George Harvey, and others, are now mere wrecks. For the synonyms of asphalt, see BITUMEN.

Asphodel (*Asphodelus*), a genus of perennial herbs belonging to the order Liliaceæ. The roots are fleshy and fasciculated, the leaves linear, and the flowers are arranged in long racemes, often compound, and continue flowering during great part of winter and early spring in their native country, covering, for instance, the bleakest hillsides in Greece with enduring blossom, whence probably their association in Greek mythology, and thence throughout poetry, with the Elysian fields. The species are not very numerous, and are mostly natives of the countries around the Mediterranean Sea. The Yellow Asphodel or King's Spear (*A. luteus*) and the White Asphodel (*A. albus*) have long been known in Britain as garden-

flowers. The yellow asphodel has an unbranched stem 2-3 feet high, much covered by the sheathing bases of the long narrow leaves. The leaves of the



White Asphodel (*Asphodelus albus*).

white asphodel are all radical, and its flowers are in branched clusters.

Asphyxia (Gr.), literally 'pulselessness,' but usually applied to the condition resulting from the blood in the body no longer being brought into the proper relations to the atmospheric air by respiration, so as to allow a sufficiently free exchange of carbonic acid for oxygen (see **RESPIRATION**). Asphyxia, or suspended respiration, may result from several causes. No air, or but a scanty supply, may be admitted, as in strangulation, drowning, choking, or disease in the windpipe; the chest may be prevented from expanding either from a superincumbent weight or paralysis, as when a man breaks the upper part of his neck above the phrenic nerve, thus paralyzing the diaphragm; and again, although there may be every capacity for respiration, the air itself may be in fault, and contain too little oxygen or too much carbonic acid in proportion to other elements. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen, or impregnating it with excess of carbonic acid.

When from any of the above causes asphyxia occurs, the respiratory movements become quicker and more forcible than normal, and additional muscles are brought into action till the respiratory acts merge in general convulsions. Meanwhile consciousness has been lost; the blood, unable to circulate freely through the lungs in consequence of its imperfect oxygenation, accumulates in them, in the right side of the heart, and in the veins, and the skin becomes livid. The short convulsive stage is followed by one of comparative quiescence, in which respiratory efforts more natural in appearance are made, but become slower and weaker till

they stop altogether. The heart continues to beat feebly for a short time after all other movements have ceased.

After death the blood is very dark in colour. It remains fluid, or nearly so, and consequently gravitates very readily to the part of the body which happens to be most dependent. The right side of the heart is found distended with fluid blood, the left nearly empty. The lungs are usually, though not always, much congested.

In man death occurs in from a minute and a half to five minutes after complete deprivation of oxygen. Some persons, no doubt, as the Ceylon divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. Restoration of asphyxiated persons may be attempted with hopes of success at a very long period after apparent death. The object of all methods is of course to fill the lungs with fresh air. For a description of these, see **RESPIRATION (ARTIFICIAL)**.

Asphyxiants, chemical substances inclosed in shells or other projectiles, and which act by producing a suffocating and poisonous effect. The French secretly made experiments with asphyxiating shot at Brest in 1851. The principle of these missiles seems to have been to carry into an enemy's ship the means of generating deadly gases which would suffocate the crews between decks. A similar device, the stinkpot, is a favourite instrument of warfare amongst the Chinese and the pirates of the eastern seas. Besides being used in this sense, the term asphyxiants is applied to any gases having a suffocating or poisonous effect on the human system. Thus coal-gas escaping in a house, the carbonic acid gas filling wine-vats, or liberated in coal-pits after an explosion of fire-damp, and the various products of combustion, are all asphyxiants which daily claim their victims. In manufactories, numerous instances occur of workmen venturing incautiously into tanks containing the vapours of chloroform, alcohol, aniline, petroleum, and other liquids, all of which act as asphyxiants. A striking case of asphyxiation occurred on 25th September 1886, at Claria quarry, Loch Fyne, where seven tons of gunpowder were exploded in order to shatter an immense face of rock. A large party of excursionists, who had witnessed the grand explosion from a steamer, landed shortly afterwards, and entered the quarry. Without any warning, about forty of them were suddenly struck down by the poisonous suffocating vapours, and although soon removed to fresh air, seven of them never rallied.

There are many devices in use for extinguishing fires by means of a portable apparatus which produces an asphyxiating gas, such as carbonic acid gas. Fire-extinguishers of this kind are called asphyxiators.

Aspic (Fr.), a savoury meat-jelly, containing fish, game, hard-boiled eggs, &c.

Aspidium. See **FERN** (MALE).

Aspinwall, or **COLON**, a town in Colombia, virtually, however, a colony of the United States. It is situated at the Atlantic extremity of the Panama Railway (1849-55), and of the inter-oceanic Panama Canal (1881-90), on the island of Manzanilla in Limon Bay, 8 miles NE. of the old Spanish port of Chagres, 17 NW. of Panama by rail, and equidistant from the great trading capitals of Valparaiso and San Francisco. Pop. about 1500, mostly blacks. From its commanding position as a place of transit, Aspinwall benefits by the traffic in both directions. The climate, formerly very unhealthy, has been greatly

improved by drainage. In 1870 the Empress Eugénie presented the town with a statue of Columbus, after whom it is named officially Colon. The name Aspinwall it derives from a New York merchant, the originator of the Panama Railway; the company having founded the town in 1850. It was burned by insurgents in 1885.

Aspirate (Lat. *spiro*, 'I breathe'), the name given to the letter *h* in grammar, as marking, not an articulate sound, but a *breathing*. It is accordingly used for the *spiritus asper* or 'rough breathing' in Greek, which, written over an initial vowel, had the force of an *h* prefixed. The name aspirate is also applied to two classes of consonants, those really blended with *h*, like the Sanskrit aspirates, or in European languages, to those followed by *h*, like the English *th*, *ch*, with *f* and *v*. In the latter and wider sense, of sixteen English mute sounds (see LETTERS), eight are *lenae*, each having its corresponding aspirate; the aspirates *f*, *v*, *th* (as in *thin*), *th* (as in *thine*), *ch*, *gh*, *sh*, *zh*, corresponding to *p*, *b*, *t*, *d*, *k*, *g*, *s*, *z*, respectively.

Aspirator is the name of an apparatus employed to draw air or other gases through bottles or other vessels. It is of great use in the examination of gases by the analytical chemist. The simplest form of the apparatus is that represented in fig. 1, where A is a large vessel capable of being filled with water, having a tube with stopcock at B, a second tube with stopcock at C, and a thermometer introduced at D. In working, the apparatus is filled with water; the tube C is attached to the vessels through which the gas is to be drawn; and the stopcocks at C and B being opened, the weight of the water escaping at B acts as suction, and draws in the gas from the tube C and the attached bottles or other vessels. The thermometer at D denotes the temperature of the water, and subsequently gas, contained in the reservoir, while the upright turn of the tube B keeps any air from entering the reservoir by that route. Another form of aspirator is represented in fig. 2. A is connected with a supply of water under pressure. As the jet of water is forced into the contracted neck at D, it draws the air from B along with it down the outlet pipe C. This form of aspirator is much used in the chemical laboratory for filtering purposes. Into the neck of the funnel is placed a small cone of platinum foil, and thereafter the filtering-paper is carefully fitted, taking care to avoid any creases. The funnel is then assced through an india-rubber cork, fitted to a strong flask, and provided with a tube connecting it with the aspirator. On opening the stopcock B, a partial vacuum is formed in the flask, and the liquid in the filter rapidly passes through. For this purpose a simpler form of aspirator, or filter-pump (as it is also called), is used, represented in the second diagram. A connects with a supply of water under pressure, while B leads to the filtering flask. On forcing water through A, the jet as it passes into the contracted neck at D draws the

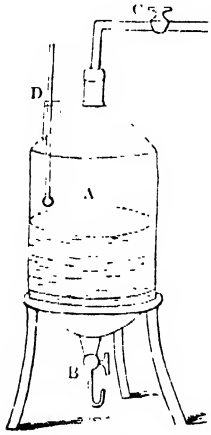


Fig. 1.

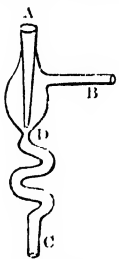


Fig. 2.

partial vacuum is formed in the flask, and the liquid in the filter rapidly passes through. For this purpose a simpler form of aspirator, or filter-pump (as it is also called), is used, represented in the second diagram. A connects with a supply of water under pressure, while B leads to the filtering flask. On forcing water through A, the jet as it passes into the contracted neck at D draws the

air from B in along with it, and carries it down the outlet pipe C, thus producing the required vacuum.

Asplenium. See SPLEENWORT.

Aspromonte, a rugged, finely-wooded mountain in the SW. corner of Italy, near Reggio, forming the extremity of the Southern Apennines, and overlooking the Strait of Messina. The summit, Montalto (6907 feet), commands a wide and beautiful view, but the ascent is very laborious. Here Garibaldi (q.v.) was defeated and captured, 28th August 1862, by Pallavicini.

Aspropotamo. See ACHELOUS.

Ass (*Asinus*), a genus of Perissodactyla (q.v.), closely related to the Horse (q.v.). It differs from the latter in having short hair at the root of the tail and a long tuft at the end, in the absence of warts on the hind-legs, and in the persistence of stripes, except in albinos. The upright mane, the long ears, the cross stripe on the shoulders, and the dark bands on the back, are also characteristic.

The domesticated form is referred for its origin by Darwin to the wild Abyssinian ass (*A. hemionus*); and he notes how the former sometimes exhibits, in the presence of cross bands on its legs, an atavistic reappearance of a character generally present in the latter. The domestication took place at an early date, probably before that of the horse, and apparently in Asia; but the donkey has been common in England only since Queen Elizabeth's time. The dwarfing and degeneration so generally exhibited are the results rather of ill treatment and careless breeding than of uncongenial climate, as the condition of the domesticated forms in some favorable parts of the East plainly indicates. In Arabia, Syria, Egypt, Spain, Kentucky, and elsewhere, the asses are well cared for, and the breed has been considerably varied and improved; a Spanish he-ass of a good breed may be worth £200. In Britain not a little improvement has been due to the kindly interest of the late Lord Shaftesbury. The stupidity for which the animal has for long been proverbially reproached seems largely the result of human influence. The male ass is capable of procreation at two years old; the female carries her foal eleven months. The *mule* is a hybrid bred between mare and male ass; while the *hinny* is the rarer result of hybridism between horse and female ass. The mule is much nearer in temper and appearance to the ass than to the horse; the hinny in some points resembles the horse more, as it neighs, while the mule brays like the ass. The ass is admirably adapted for a beast of burden, being remarkable for endurance, hardiness, and docility under kind treatment. The peculiar pace, the quaint intelligence, often superior in spite of ill usage to that of the horse, curious traits of character such as the aversion to cross water, which is probably an unconscious recollection of ancestral nomadic life, the longevity and general hardiness, are facts as familiar as the names donkey, dicky, neddy, cuddie, &c. of these useful animals.

The various species of wild asses are handsomer in form than the familiar degenerate donkey. They have shorter ears, and longer, finer limbs. The shy, swift *A. onager* occurs in herds in the Asiatic deserts, migrating southwards in winter. The large, handsome *A. hemionus*, with dark stripes on its back, inhabits high plateaus from Tibet to Mongolia; see DZIGGETAL. The Abyssinian form has been already noted as the probable ancestor of the donkey. The even wilder Zebras and Quaggas will be discussed separately.

The wild ass is hunted in the East—e.g. in Persia; and the flesh of the hardly-won booty is much esteemed. The milk of the ass is more sugary and less cheesy than that of the cow, and is on that account recommended to some invalids—

e.g. consumptives. The leather called Shagreen (q.v.) is made by a peculiar process from the skin, which is also utilised for shoes and drums. The



The Wild Ass.

ancients are said to have used the bones for making flutes. From early times, white (albino) asses were reserved for the use of the honoured. The reader may be referred to Darwin's *Animals and Plants under Domestication*, where some other works are noted. See DOMESTICATION, HORSE, ZEBRA, QUAGGA.

Assab Bay, an Italian trading station on the west coast of the Red Sea, 40 miles NW. of the Strait of Bab-el-Mandeb. The district around it, with an area of 243 sq. m., and 1300 inhabitants, was sold in 1870 by some Danakil chieftains to an Italian steamship company for a coaling station on the road to India. In 1880 it was taken over by the Italian government, who, since 1884, have improved the harbour and erected a lighthouse.

Assai, a creamy, purplish beverage used on the Amazon, made from the fruit of certain palms.

Assal, a large salt-lake in the district of Adal in Eastern Africa, nearly 9 miles from the coast of the Bay of Tajurah. It is nearly 600 feet below the level of the sea. Abyssinian caravans resort to Assal for the purpose of carrying off the salt, which is thickly incrustated on its shores.

Assam, a province at the NE. extremity of British India, stretching in N. lat. between 23° and 28°, and in E. long. between 89° and 97°, with an area of 46,341 sq. m. In 1874 it was formed into a separate administration (including Cachar) under a chief-commissioner. It consists of a fertile series of valleys, watered by the Brahmaputra and more than sixty lesser rivers. It is thus very fertile, and abounds in wood. The tea-plant is indigenous, and some believe that the *Thea assamica* is the original of the Chinese plant. Since 1840, when its commercial cultivation was begun, 600,000 acres have been taken up for tea; in 1882 there were over 1000 gardens. Some three-fourths of the tea grown in India is the produce of Assam; and between 1875 and 1885 the total exports of Indian tea increased from 25,000,000 lb. to above 65,000,000 lb. Coolies are imported from Western Bengal for the work in the tea-gardens. The other products are rice, mustard, gold, ivory, amber, musk, iron, lead, petroleum, and coal. From Bengal the principal imports are woollens, Indian fabrics, salt, opium, glass, earthenware, tobacco,

betel, &c. For want of population, scarcely a fourth of the fertile area is cultivated. There is steamboat communication from Calcutta to Dibrugarh, 661 miles, and a railway from Calcutta to Dhoobri, 322 miles. The revenue in 1882-83 was £584,921, and the expenditure £615,759.

In 1826, at the close of the first Burmese war, Assam was ceded to the British. The upper portion of the province, however, was conferred, as a separate principality, on the native rajah, whom the Burmese had expelled; and it was only in 1838, that in consequence of his misgovernment, the entire country was placed under British administration. Since then the province has exhibited a noticeable improvement. The population being rural and agricultural, the only towns of any size are Gauhati (12,000) and Sebsagar (6000). The peasantry are indolent, good-natured, and fairly prosperous, short and robust in person, with a flat face and high cheek-bones, and coarse black hair. A majority of the people are Hindus. In 1883 there were 1500 educational institutions, with an attendance of 50,000 pupils.

One of the most striking features of Assam is the abundance of wild animals, such as tigers, rhinoceroses, leopards, bears, buffaloes, and elephants. The snakes are the most destructive to human life. Some 400 people are killed every year by wild animals, for whose destruction about £1000 is yearly paid as a reward. The forests teem with game, and the rivers with fish. Pop. (1872) 4,124,972; (1881) 4,881,426, being 105·3 to the square mile. See Hunter's *Statistical Account of Assam* (1880).

Assassination, the act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, by one devoted to the deed, or by one who has taken the task upon himself. Generally, the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times, assassination was not unknown, and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogeiton (q.v.); but assassination by enthusiasts and men devoted to an idea first becomes really prominent in the religious struggles of the 16th and 17th centuries. To this class belong the plots against the life of Queen Elizabeth; while the horrible succession of assassinations of Roman emperors is simply a series of murders prompted by self-interest or revenge. Omitting these last, which are noted elsewhere, the following list includes the most important assassinations, arranged in chronological order. With one or two exceptions, fuller accounts of the persons mentioned will be found under their particular headings.

Julius Cæsar	Mar. 15, B.C. 44
Thomas Becket	Dec. 29, A.D. 1170
Albert I., Emperor of Germany	May 1, 1308
James I. of Scotland	Feb. 21, 1437
Alessandro de Medici	Jan. 5, 1537
Cardinal Beaton	May 29, 1546
David Riccio	Mar. 9, 1566
Lord Darnley	Feb. 10, 1567
James, Earl of Murray, Regent	Jan. 23, 1570
William of Orange	July 10, 1684
Henry III. of France, by Jacques Clément	Aug. 1-2, 1589
Henry IV. of France, by Ravallac	May 14, 1610
Villiers, Duke of Buckingham, by Felton	Aug. 23, 1628
Wallenstein	Feb. 25, 1634
Archbishop Sharp	May 3, 1679
Gustavus III. of Sweden	Mar. 16; died Mar. 29, 1792
Marat, by Charlotte Corday	July 13, 1793
General Klever, at Cambray	June 14, 1800
Paul, Czar of Russia	Mar. 21, 1801
Spencer Perceval, premier, by Bellingham	May 11, 1812
Kotzebue, the dramatist	Mar. 23, 1819
Duc de Berri	Feb. 13, 1820
Charles III., Duke of Parma	Mar. 26; died Mar. 27, 1854
Abraham Lincoln, by Booth	April 14; died April 15, 1865

Michael, Prince of Servia.....	June 10, 1868
Marshal Prim.....	Dec. 28; died Dec. 30, 1870
Georges Darboy, Archbishop of Paris, by communists.....	May 24, 1871
Earl of Mayo, governor-general of India.....	Feb. 8, 1872
Sultan Abdul-Aziz.....	June 4, 1876
Alexander II., Czar of Russia.....	Mar. 13, 1881
James Abraham Garfield, at Washington, by Guiteau.....	July 2; died Sept. 19, 1881
Lord Frederick Cavendish and T. H. Burke, in Phoenix Park, Dublin.....	May 6, 1882

In the foregoing list no mention is made of plots or attacks ending in failure. Several of those who fell had previously escaped more than once. The *Assassination Plot* in English history was a conspiracy by some Jacobites to murder William III. in 1696. It is doubtful whether Louis XIV. and James II. were privy to the scheme; the chief conspirator was Sir George Barclay. The king was to have been assassinated at Turnham Green on his return from a hunting-party; but one of the forty conspirators sent word to the king, the hunting was postponed, a number of the conspirators were arrested, and nine of them executed. A catalogue of unsuccessful attempts at assassination would be too long for insertion here; but the most important within the last hundred years have been directed as follows: Against Alexander III. of Russia, repeatedly; Alfonso XII. of Spain, 1878 and 1879; Amadeus of Spain, 1872; Duc d'Anmale, 1841; Prince Bismarck, 1866 and 1874; Francis Joseph of Austria, 1853; George III. of England, 1786 and 1800; George IV. (when Regent), 1817; Humbert I. of Italy, 1878; Isabella II. of Spain, 1847, 1852, and 1856; Louis-Philippe, six attempts from 1835 to 1846; Lord Lytton, Viceroy of India, 1878; Napoleon I., by infernal machine, 1800; Napoleon III., twice in 1855, and Orsini's attempt in 1858; Queen Victoria, June 10, 1840, May 30, 1842, July 3, 1842, May 19, 1849, and March 2, 1882; William I. of Germany, 1861, 1875, and twice in 1878. See the next article; also, BARTHOLOMEW'S DAY, GUNPOWDER PLOT, Nihilism, THUGS; and the article 'Political Assassination' in the *Edinburgh Review* for July 1887.

Assassins, a fanatical branch of the secret Moslem sect of the Isma'ilis (q.v.). The esoteric doctrines of the latter taught that all actions were morally indifferent; and the atrocious career of the Assassins was but a natural sequence of such teaching. The founder of this body, Hassan ibn-Sabbah, a Shi'ite of Khorassan, had, about the middle of the 11th century, studied at Nishapur, and had subsequently obtained from Isma'ili *dais*, or religious leaders, a partial insight into their secret doctrines, and a partial consecration to the rank of *dai*. But at Cairo he quarrelled with the heads of the sect, and was forced to quit Egypt, and return by Aleppo and Damascus to Persia. Here he gradually gathered followers, and in 1090 he conquered the rock-fortress of Alamut, in Persia, founding there a famous society, resembling the Isma'ilis in speculative doctrines, but marked by one peculiar feature—the employment of secret assassination against all enemies. The internal constitution of the order was as follows: First, as supreme and absolute ruler, came the *Sheikh-ul-jabal*, the 'Old Man of the Mountains.' Then came his three vicegerents, the *Dai-ul-Kirbat*, or grand-priors of the order; thirdly, the *Dais*, or priors; and fourthly, *Kephks*, associates, which last were not initiated, like the former, into all the secret doctrines. To the uninitiated belonged first of all the *Fedaris* or *Fedais* ('the devoted'), a band of resolute youths, the ever-ready and blindly obedient executioners of the Old Man of the Mountains. Before he assigned to them their bloody tasks, he used to have them thrown into a state of ecstasy, by the intoxicating influence of the *hashish* (the hemp plant), which circumstance led to the order

being called *Hashishin* ('hemp-eaters'). The word was changed by Europeans into *Assassins*, and transplanted into the languages of the West with the signification of 'murderers.' The *Lasiks*, or novices, formed the sixth division of the order, and the labourers and mechanics the seventh. Upon these the most rigid observance of the Koran was enjoined; while the initiated, on the contrary, looked upon all positive religion as of no importance. This powerful and unscrupulous sect soon inspired widespread terror. Hassan died in 1124, leaving as his successor his chief *dai*, Kia-Busurg-Omid. Under him the Assassins established a stronghold in Syria, and proved their power by the murder of two successive califs. In 1163 Hassan II. was rash enough to extend the secret privilege of the initiated—exemption, namely, from the positive precepts of religion—to the people generally, and to abolish Islamism in the Assassin state; which led to his falling a victim to his brother-in-law's dagger. Under the rule of his son, Mohammed II., who acted in his father's spirit, the Syrian *Dai-ul-Kirbat* Sinan became independent, and entered into abortive negotiations with the Crusaders. It was his emissaries who killed Count Raymond of Tripoli and Conrad of Montserrat. Mohammed was poisoned by his son, Hassan III., who reinstated Islamism for the uninitiated. Hassan was succeeded by Mohammed III., a boy only nine years old, who, by his effeminate rule, led to the overthrow of the order, and was eventually murdered by the command of his son, Rokneddin, the seventh and last Old Man of the Mountains. In 1256 the Tartar prince, Hulaku, burst with his hordes upon the hill-forts of Persia held by the Assassins, and destroyed them. The Syrian branch was also nearly extirpated in 1270 by the Mameluke sultan, Bibars. A heretical sect descended from them still linger in the mountainous parts of Syria, among the Druses and Ansarii, and cling to a belief in the allegorical interpretation of the Koran. See Von Hammer, *Geschichte der Assassinen* (1818); Walpole, *The Assassins, or Assassins* (3 vols. 1851); and Guyard, *Fragments relatifs à la Doctrine des Ismaélites* (1874).

Assault. In English law, a person is guilty of an assault if he attempts unlawfully to apply any force, however slight, to the person of another, or if he uses any gesture indicating an intention to commit an assault. If any force, however slight, is actually applied to the person or dress of another, the act amounts to *battery*. If a person violently deprived another of a member proper for his defence, such as a leg, an arm, a finger, an eye, or a fore-tooth, the ancient law held him guilty of *mayhem* or maiming; but this term is now obsolete. Violence is not necessary to constitute an assault; for the law, says Blackstone, cannot draw the line between different degrees of violence, and therefore prohibits the first and lowest stage of it, every man's person being sacred. Mere words can never constitute an assault.

Assault is a civil wrong, giving rise to an action for damages; and, as a general rule, the court will not interfere with the discretion of the jury in assessing the damages. It is sufficient to prove any act from which the unlawful intention may be implied. Thus, throwing water on a man, or riding after him and compelling him to run away, are both acts of trespass or assault. If X throw a lighted squib at Y, who in self-defence throws it from him so that it falls on Z, this is an assault by the first thrower, X, on Z. The defendant may plead that his act was unavoidable, or that it was committed by leave of the plaintiff, or in self-defence, or (if the plaintiff be his child) that the assault was committed by way of reasonable chastisement. He may also plead that the case has

already been disposed of by a court of summary jurisdiction; and magistrates dealing with ordinary charges of assault are empowered to give a certificate which protects the person charged against further proceedings.

A common assault is a misdemeanour, punishable by one year's imprisonment. It is plain that all crimes against the person, such as robbery or murder, include an assault. Special statutory provisions apply to the following cases of aggravated assault: (1) Indecent assault. It is an assault to take indecent liberties with a female, even if her consent is procured by fraud, as, e.g. if the offender pretends to be her husband. (2) Assaults on public officers, clergymen, &c. in the performance of their duties. (3) Assaults causing actual bodily harm, which are punishable by five years' penal servitude. Assaults with intent to do grievous bodily harm, as, e.g. by shooting, or administering poison, or placing an obstruction in front of a railway train, usually amount to felony, and are punishable with penal servitude for life. Maliciously starving a servant or apprentice is a misdemeanour.

Generally speaking, the same defences may be relied on in criminal and civil proceedings. But consent is no defence where the injury done extends to maiming, or to a breach of the peace. The principals in a prize-fight, for example, are guilty of assault, and all persons present at the fight are aiders and abettors in the commission of the offence.

In Scotland, the principle of the law of assault, and of its aggravations, is very much the same as that above stated. In the Scotch system, it is laid down that it is of the utmost importance in all cases of actual assault to ascertain who struck the first blow, and the party who receives it will be excused for retaliating, if he do not exceed the just and fair measure of resentment. There, too, the highest of all aggravations is the assault with intent to murder. It is also an aggravation that the assault has been committed in pursuance of an old grudge, and on a principle of revenge; where, also, the offence has been accompanied with an intent to compel a rise of wages, or to deter from working at a certain rate, or in pursuance of a combination entered into for these illegal purposes. Another aggravation of the offence in Scotland is its being committed by a child on its parent, by a husband on his wife, or by any person upon another within his own house, although the latter crime falls more strictly under the antiquated term of *Hauszucken* (q.v.). The remedy in Scotland is, as in England, by civil action of damages, and by a criminal prosecution, both being maintainable, and the latter usually at the suit of the Lord Advocate, as public prosecutor; but the private injured party may prosecute criminally should the Lord Advocate decline to do so.

The Scotch law formerly recognised a separate offence known as battery *pendente lite*, which consisted in assaulting an adversary in a lawsuit during its dependence. This offence was created by statute passed in 1584 and 1594, which provided, quaintly enough, that the offender should be punished by losing his cause. The statutes in question were repealed in 1826.

In the United States, the same general definition of an assault is accepted. Special statutes provide for punishment of assaults on government officials while in the discharge of their duty; but in general, assaults, whether with or without a dangerous weapon, are punishable under state laws rather than under those of the United States.

Assaye, an Indian village in the extreme north-east of the Nizam's dominions, 43 miles N.E. of Aurangabad, the scene of a decisive victory gained

by General Wellesley, afterwards Duke of Wellington, 23d September 1803, with 4500 men, over a Mahratta force of 50,000 under Sindia and the rajah of Berar. About a third of Wellesley's small force was killed or wounded, while 12,000 of the enemy fell. The victory was the first great blow to the Mahratta supremacy.

Assaying is the art of determining the proportion of any specified metal in a given metallic ore or in an alloy. The various methods of estimating the amounts of base metals present could not, however, be usefully set forth within the limits of the present article, and the reader who requires technical information in regard to them must be referred to the special works enumerated at the end; we shall here limit our attention to the methods commonly adopted for ascertaining the amount of gold or silver present in an ore or alloy. Although the actual process adopted for assaying an ore is the same as for an alloy, the former has to be subjected to certain preliminary treatment in order to bring the metal present into a convenient form. This consists of 'scorification' or 'fusion,' with or without a previous 'roasting,' in case carbonaceous or other oxidisable substances are present, as happens with jewellers' 'sweep,' &c. Such roasting is conducted in an open dish with free access of air, as in a muffle furnace. The process of scorification is conducted also in a muffle furnace, in a non-porous fireclay dish or 'scorifier' heated to bright redness. One part by weight of a carefully taken sample of the ore in a fine state of division is mixed in the scorifier with from ten to twenty times its weight of granulated lead, and one-tenth its weight of borax, and the whole left in the muffle for about half an hour. On withdrawing the scorifier, its contents are poured into a cup-shaped iron mould, and when cold, the slag can be detached from the lead button, which contains all the gold and silver originally present in the ore, and only requires to be cupelled as explained below. When the 'fusion' or 'crucible' method is adopted, the prepared ore is mixed with red lead, charcoal-powder, carbonate of soda, and borax, in proportions depending on the nature of the ore, and placed in a crucible which is heated in an ordinary furnace for about a quarter of an hour, when the whole may be poured into a mould, and a lead button, containing the precious metals, obtained as in the scorification process.

The 'cupellation' method of assaying gold and silver is of the highest antiquity. It depends essentially on the fact that molten litharge, monoxide of lead, PbO , is capable of holding in solution oxides of other metals with which it may be brought in contact, and thus separating them from unoxidisable metals. If, for example, gold, silver, copper, and lead are brought into a state of fusion in a current of air, the lead on becoming oxidised will take up the oxidised copper; the gold and silver, however, being unoxidisable, will not be so absorbed, and it only becomes necessary to provide a means of removing the oxides in order to obtain the precious metals which have thus been isolated. This is readily effected by using a 'cupel,' formed of compressed bone-ash, of some such form as is shown in fig. 1; being porous, it absorbs the oxides, while the molten gold and silver remain on its surface like a bead of mercury. One or more of these cupels, according to the number of assays to be made, are arranged on the floor of a muffle or oven of fireclay, provided with orifices at the sides and ends to produce the requisite draught, as indicated in fig. 2, and heated externally by anthracite, coke, charcoal, or gas. The operations comprised in the assay of an alloy containing silver by cupellation may be thus briefly described. A clean piece of the alloy, say

12 grains in weight, is accurately weighed on an assay balance. It may then conveniently be wrapped up in the whole or a portion of the



Fig. 1.



Fig. 2.

lead required for cupellation in the form of foil. The amount of lead taken, being dependent on the proportion of oxidisable metal present in the alloy, will, of course, depend on the composition as approximately judged from the colour, appearance of cut, &c.: three times the weight of the assay-piece for fine, or nearly fine, silver, six times for English standard (92.5 per cent.), and a still greater proportion for coarser varieties. The muffle having been raised to a red, but not bright-red, heat, the assay parcel is charged into a cupel, and the temperature maintained uniform. After a lapse of from twenty minutes to half an hour, it will be found that all the lead has been converted into litharge, and either volatilised or absorbed by the cupel, the completion of the operation being preceded by the passage of brilliant iridescent colours over the surface of the button, and, as soon as these cease, by an instantaneous increase in its brilliancy, known as *flashing* or *brightening*. The muffle is now closely shut up, and the temperature allowed to gradually fall until the button is set. It is then removed, hammered to detach adhering bone-ash, and weighed.

If there is reason to suspect the presence of small quantities of gold, it will only be necessary to dissolve the silver button, after weighing, in nitric acid (equal parts pure acid and water), collect the black deposit (the gold) that remains undissolved, and wash, ignite, and weigh it.

In many cases it is possible to ascertain the amount of silver present in an alloy without resort to cupellation. For this, the *humid*, or Gay Lussac's method, it is essential that the composition be previously known within comparatively close limits. Knowing this, it is easy to calculate what weight of the alloy contains 1 gramme of pure silver, by simply dividing the estimated percentage composition into 1000. This amount having been dissolved in nitric acid (equal parts pure acid and water), a measured volume of solution of common salt, standardised so as to precipitate exactly 1 gramme of silver, is added. By vigorously shaking the bottle for a few minutes, the white precipitated chloride will agglomerate, leaving a clear solution above; and on adding a small quantity of salt solution, the production of a further precipitate will indicate the presence of silver still in solution. Measured quantities being thus added, and the bottle shaken after each addition, a point will be reached at which no further precipitation occurs, and the total quantity of salt solution employed affords a means of ascertaining how much silver was actually present in the portion of alloy taken for assay. If W be the weight of silver alloy taken in grains, A its assay, M the volume in c.c. of standard salt solution (of which 100 c.c. will precipitate 1 gramme of silver) required to saturate it, then $A = \frac{10M}{W}$.

The method of assaying gold alloys remains to be considered. This is always effected by cupellation, and, in the rare event of silver being *known* to be entirely absent, a simple cupellation with

lead, as in the case of silver, will suffice, a gold button being obtained and weighed. If, however, even a trace of silver is present, the process involves several additional operations to effect its complete removal. The *inpartation* method adopted derives its name from the fact that the gold present is associated with about three times its weight of silver previous to cupellation, the object being to obtain a button in which the gold is distributed like a sponge so as to facilitate the subsequent removal of the silver by solution in nitric acid. The amount of lead varies, as in the case of silver, with the composition. With gold, from pure down to 22 carat, about six times its weight; from this point to 15 carat, eight times; and for lower qualities, ten times its weight will generally suffice. It is generally safer to take a weight of silver equal to two and a half times the weight of gold estimated to be present. The assay-piece, which may weigh half a gramme, having been very accurately weighed, is wrapped, together with the requisite silver, in the lead, and charged into a cupel in the muffle, the temperature of which may be appreciably higher than when cupelling silver. The phenomena observed are similar to those already described, and, on its removal from the cupel, the button, having the form shown at *a* in fig. 3, is brushed, flatted (*b*) on an anvil, annealed at a red heat, and drawn out into a *fillet* (*c*) in a

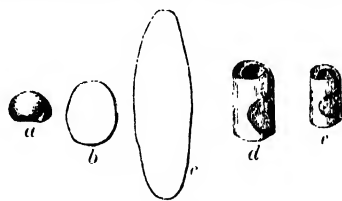


Fig. 3.

small rolling-mill to about the thickness of a calling-card, in order to still further facilitate the removal of silver. After being again annealed, this is coiled into a *cornet* (*d*) between the finger and thumb. The precise manner in which the boiling in nitric acid is effected depends on the number of assays that are made. In large assay offices, as in that of the Royal Mint, a platinum boiling apparatus is now generally employed; but this is expensive, and, for smaller numbers of assays, the older method of boiling separately in 'parting' flasks is available. When adopting the former method, each cornet is placed in a small perforated platinum cup, a number of these being ranged on a tray of the same metal, which is introduced into the acid (specific gravity 1.2) contained in a boiler also of platinum. After remaining for about twenty-five minutes, the tray is removed, washed in hot distilled water, and transferred to acid of specific gravity 1.3 in a second boiler, and kept at the boiling-point for a similar period. On again being removed, the tray is washed, and raised to a red heat in the muffle, which causes the dull-red fragile cornets to cohere, assume the yellow colour of gold, and shrink in about the proportion of *d* to *e* (fig. 3). The cornets are then weighed.

In parting in a flask, the cornet is boiled for ten minutes in 2 or 3 fluid ounces of the first acid, the flask nearly filled with hot distilled water, and decanted. A similar quantity of the second acid having been added, the boiling is continued for fifteen minutes, and water again added. After decanting, and once or twice washing, the cornet is transferred to a small porous crucible, in which it is annealed at a red heat, when it is weighed.

The old method of assaying gold by the *touch-*

stone is still occasionally resorted to when an approximate estimate of the composition is desired without damaging the object. This consists in comparing the appearance of a streak made with the metal on a hard basaltic stone of dark colour, with those produced by certain *touch-needles*, the composition of which is known, after all the streaks have been subjected to the action of nitric acid. The touch-needle whose streak most nearly corresponds with that of the unknown sample is selected as corresponding with it in composition. Another convenient mode of estimating the assay of a gold-copper alloy, without in the slightest degree damaging it, is to accurately determine its density by any of the well-known methods. From this density the amount of gold present is approximately calculated as follows: Let D be the density thus obtained; W , the weight of the object; w , the weight of gold in the object; w_1 , the weight of copper; d , the density of gold = 19.3; d_1 , the density of copper = 8.6. Then

$$\frac{W}{D} = \frac{w}{d} + \frac{w_1}{d_1};$$

whence we obtain for w , the gold present,

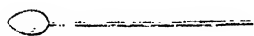
$$w = \frac{W(Dd_1 - dd_1)}{D(d_1 - d)},$$

and assay required = $\frac{w}{W} = \frac{19.3 D - 166}{10.7 D}$.

A few words must be added as to ascertaining both the silver and gold contained in an alloy. It becomes necessary either to perform separate assays, or to subject one assay-piece to cupellation twice. The assay is first conducted without adding silver, and the resulting button weighed as though it were a silver assay. After adding silver and lead, the button is again cupelled and treated as a gold assay. The weight of gold finally obtained is deducted from that of the first button, and the difference gives the weight of silver present. Some experience is necessary in order to accurately estimate this latter metal.

The reader who requires more detailed information in regard to the above, or other assay methods, is referred to the following works: Mitchell's *Manual of Practical Assaying*; Percy's *Metallurgy*; Makins' *Manual of Metallurgy*; Balling's *Manuel de l'Essayer*.

Assegai, a slender spear of hard wood, tipped with iron, used in battle by the South African tribes, notably the warlike Zulus. Some assegais



Various forms of Assegais.

are held in the hand and used as spears for thrusting; a shorter kind are hurled from the hand as missiles. The word, originally a Berber name, was adopted by the Moors into Arabic, and thence into Spanish and Portuguese. It was the Portuguese use of it in Africa that passed into English and French.

Assemani, (1) JOSEPH SIMON, a famous orientalist, born of a Maronite family at Tripoli, in Syria, in 1687. After completing his studies at Rome, he travelled on the pope's commission through Egypt

and Syria, collecting many oriental MSS. and coins for the Vatican Library, of which he was appointed keeper. He died at Rome, January 14, 1768. Of his numerous learned works, the most important is his *Bibliotheca orientalis Clementino-Vaticana* (4 vols. Rome, 1719-28), containing the Syrian MSS. of the Vatican. He was succeeded as keeper of the Vatican Library by his nephew, (2) STEPHEN EPHOBIUS (1707-82), also a learned author of books on orientalist learning. Yet another nephew and orientalist was (3) JOSEPH ALOYSIUS (1710-82), professor at Rome.—(4) SIMON, a relative of the preceding, was born at Tripoli in 1752, filled the chair of oriental languages at Padua, and died there, April 8, 1821. One of the greatest orientalists of his time, he wrote an important work on ancient coins, *Museo eufico Naniano illustrato* (2 vols. Padua, 1787-88).

Assembly, GENERAL, in Scotland, Ireland, and the United States, denotes the highest court of the Presbyterian Church. It differs from the Anglican Convocation at once in its constitution and in its powers, representing as it does both the lay and the clerical elements in the church, and possessing legislative and judicial authority in all matters purely ecclesiastical. The General Assembly of the Established Church of Scotland consists of representatives, clerical and lay, from all the presbyteries of the church. The royal burghs of Scotland also return elders to the General Assembly of the Established Church, and each of the Scottish universities sends a representative. The Assembly meets once a year, in the middle of May, at Edinburgh, and sits for ten days. Its deliberations are presided over by a Moderator, whose election is the first step in the proceedings, after a sermon by his predecessor. In former times, this office was sometimes filled by laymen: among others, in 1567, by George Buchanan. In modern times, the moderator is always a clergyman. 84 presbyteries, composing 16 synods, return members to the General Assembly of the Established Church of Scotland. Its relation to the state is represented by a royal commissioner, who exercises no function in the Assembly beyond that of adding by his presence the sanction of the civil authority to its proceedings. The other functionaries are a principal and a deputy clerk (both clergymen), a procurator, and an agent. All business not despatched during the session is referred to a commission, with the moderator as convener, which meets immediately after the dissolution of the Assembly, and again at intervals of three months. The General Assemblies of the Free Church of Scotland, which has 16 synods comprising 73 presbyteries, and of the Irish Presbyterian Church, are similarly constituted, the principal points of difference being the representation of presbyteries only, greater legislative and judicial independence, and the absence of the royal commissioner. The General Assembly of the Presbyterian Church in the United States, representing 23 synods and 182 presbyteries, mostly in the Northern States, meets annually in May, but has no stated place of meeting. There is also a General Assembly of the Southern Presbyterian Church (67 presbyteries), and of the United and Cumberland Presbyterians; while the Reformed Presbyterian Church of the United States, like the United Presbyterian Church in Scotland, calls its supreme court the synod. See PRESBYTERIANISM, BARRIER ACT, &c.

Assembly, NATIONAL. See FRANCE.

Assembly of Divines. See WESTMINSTER.

Assen, chief town of the Dutch province of Drenthe, connected with the Zuyder Zee by canal, and with Groningen by railway, with some trade in corn and peat. Pop. (1879) 7932

Asser, King Alfred's biographer, was a monk of St Davids (*Menevia*), who, about the year 885, was invited to the court of Alfred. Here he resided at intervals till the king's death (901), assisting him in his studies, and enjoying an affectionate confidence, of which he seems to have every way been worthy. Alfred promoted him to various dignities, and prior to 900 made him Bishop of Sherborne. He died in either 909 or 910. His life of Alfred, *De rebus gestis Alfredi Magni*, was first published, with various interpolations, in 1572, by Archbishop Parker. Its trustworthiness was questioned by Wright, but has been accepted by Pauli and Freeman. The best edition is that of Wise (1722), which is followed in Petrie's *Monumenta Hist. Brit.* (1848).

Assessment is a valuation of property, income, or profits, for the purpose of taxation, made by authorised persons according to their discretion, as opposed to a sum determined by law; or the fixing of the amount of damages, as by a jury. See TAXES, DAMAGES. For assessed taxes, see TAXES.

Assessors are persons sometimes associated with judicial functionaries, to assist in the argument and procedure before them, and to advise their judgments. They may be usefully employed by persons in judicial stations whose previous education and pursuits scarcely qualify them for the duties cast upon them. Assessors are usually barristers or advocates learned in the law, and familiar with judicial proceedings. By the Municipal Corporation Act, it is enacted that the burgesses shall annually elect from among those qualified to be councillors two auditors and two assessors, the former to audit the accounts of the burgh, and the latter to revise the burgess list. In the ecclesiastical law of England, a bishop, who is a spiritual judge, is assisted by his chancellor, as the episcopal assessor, and who in fact holds courts for the bishop. But in the case of a complaint against a clergyman for any ecclesiastical offence under the Church Discipline Act of 1840, the bishop is directed to inquire into the matter, assisted by three assessors, of whom the dean of his cathedral, or one of his archdeacons, or his chancellor, must be one, and a barrister another. In Admiralty cases the judges may command the assistance of nautical assessors. The judges of the common law courts and the Queen's counsel are, as a condition of their offices, assessors, or more properly assistants, of the House of Lords, advising the House on points of law which may be propounded to them by their lordships. In the Scottish universities, certain nominated members of the university court are called assessors.

In the United States, the term is only employed in the common sense of persons elected or appointed to determine the value of property liable to assessment.

Assets (Norman-French *asez*, 'enough,' from late Lat. *ad satis*, 'to sufficiency'), a term signifying the property of a deceased person which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptance, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or to a trading association.

Assets are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor; and the latter including

all real estate, whether devised or descending to the heir at law. In connection with this distinction, assets are also said to be *assets by descent*, and *assets in hand*, the former of these being recoverable from the heir to whom the land descends, and so far as such lands will extend—assets in hand, again, signifying such property as a person leaves to his executors sufficient for the clearing of burdens and bequests affecting his personal estate. Assets are also in their nature either *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. Where there are several creditors of equal degree, the executor is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole assets which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or technically by a plea of *plene administravit*; and upon this plea the creditor is entitled to judgment that he shall be paid out of any other assets that shall come to the defendants which is called a judgment of assets *in futuro*.

Assets is not a law term in Scotland, but it is nevertheless much used in the business of that country.

In the United States, the assets are broken up into several funds, and where some of the creditors can resort to two or more funds, while others can legally only resort to one, a court of equity will, by 'marshalling assets,' compel the more fortunate creditors to exhaust the fund first upon which they have the exclusive claim; or, if they have been satisfied from the general fund, to permit others to stand in their place as to the exclusive fund, that so an equitable division of assets may be made among all the creditors.

Assidians. See CHASTIDITY.

Assiento (Span., 'contract'), a word specially applied to a contract between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. Charles V. first formed such a compact with the Flemings; and similar ones were entered into with the Genoese (1580), with the French Guinea Company (1702), and with England (1713). The British government made over its privilege to the South Sea Company for thirty years, permission being also granted to send yearly a ship, carrying 500 tons of goods, to the Spanish colonies. The misunderstandings arising hence contributed not a little to the war that broke out between the two nations in 1739. At the peace of Aix-la-Chapelle in 1748, the English company having still four years to run, their rights were guaranteed to them; but they relinquished them at the Madrid Convention of 1750, upon the payment of £100,000, and the concession of certain commercial advantages.

Assign is a legal term used in both English and Scottish law to indicate generally the transfer of property, but more particularly the transfer of movable property and personal rights. The word is also applied to the persons to whom the transfer is made. Very often, however, the word, when used—e.g. in a deed of transfer to A. B. and his assigns—is mere surplusage, because it includes everybody who takes from A. B., and the transfer to A. B. implies that he has the power of transferring to his assigns.

Assignment is a form in Scots conveyancing, analogous to the English word Assignment (q.v.).

by means of which the holder of any right, or the creditor in any obligation, or the proprietor of any subject not properly feudal (see FEUDAL SYSTEM), transfers his right or estate to another. The party making the assignation is called the *cédent*, and the party in whose favour the assignation is made is called the *assignee* or *cessionary*, words which are derived from the French law. In the case of debts, there was originally no power in the creditor to assign his right, and, accordingly, the form of assignation still shows that the transaction was regarded as one of mandate to recover the money for the creditor. Now, however, it is recognised that, unless the assignation be in security, the whole right of the creditor is transferred to the assignee, who comes exactly in place of his author. It follows that the debtor can state against the assignee any defences (such as set-off) which, at the date of the assignation, he might have stated against the creditor; but the assignee, on the other hand, is not affected by any latent trust or agreement between the debtor and other parties. In order, however, to complete the assignation, it must be *intimated* to the common debtor—that is, the party originally indebted to the *cédent*—and so essential is this intimation, that in the case of competing claims against the right, interest, or estate assigned, the assignation first intimated will be preferred to one prior in date, but posterior in the date of intimation. Such intimation ought to be made by a *Notary Public* (q.v.), but other formal notices of the assignation have been admitted, as in the General Clauses Act, relating to railways and other companies, and in the Transmission of Movables Act, 1862. Between the parties, of course, mere private knowledge on the part of the debtor is sufficient, but this will not give a preference in a competition. But there are certain assignations which require no intimation, such as adjudication and other judicial assignations, marriages contracted before 1881, which are legal assignations of the wife's movable estate to the husband, and the statutory conveyance to a trustee in bankruptcy. The assignation of a debt implies and warrants that the debt is due, but not that the debtor is solvent. Bills and notes, though documents of debt, do not require assignation, but pass, by indorsement, without notice. Bonds, policies of assurance, protests of bills, &c. are generally, in Scotland, assigned according to certain short forms provided by statute in 1862. Special statutory provision is made for the assignation of such movable rights as patents, copyrights, and registered ships. Personal rights to land are also the subject of assignation, and every conveyance of land contains one clause assigning the rents, and another assigning the writs—that is, the title. In Scottish agricultural leases, assignees are generally excluded expressly.

Assignats. After appropriating to national purposes the land belonging to the church, the French National Assembly, instead of bringing it into the market at a time of insecurity, when its value was depreciated, issued bonds on the security of it, which were called *assignats*, as representing land assigned to the holder. This paper-money consisted chiefly of notes for 100 francs (£4) each, though many of them were for lower sums; and the first issue, in 1790, amounted to 400 million francs. The system relieved the government: 'the assignats saved the revolution' for the time being. The facility of this plan of providing government income led to its being repeatedly had recourse to, as the property of wealthy emigrés was confiscated, till the amount rose to the enormous sum of 45,578 million francs, besides great numbers of forged notes—for the assignats were easily counterfeited. The value of the assignats naturally

soon began to decline, and confidence once gone, the devaluation became fearful. In June 1793, one franc in silver was worth three francs in paper; in August it was worth six. The state took the most extreme measures to compel the acceptance of these notes at their full nominal value. The effects of these were to cause the assignats to flow back into the public treasury, to raise the prices of all commodities, and to make every one averse to have any dealings with the state. All business became disorganised. At last the value of assignats sank almost to *nil*. Millions had suffered incalculable loss, and only a few who had bought public lands with the assignats that cost them little or nothing, had enriched themselves at the expense of the community. In March 1796, a louis d'or (24 francs) bought 7200 francs in assignats. After this, they were withdrawn from the currency, and redeemed at a thirtieth of their nominal value, by 'territorial mandates,' a new kind of paper-money, which enabled the holder at once to take possession of public lands at the estimated value, while assignats could only be offered at a sale. The *mandats* also soon fell to a seventieth of their nominal value, and were returned to government in payment of taxes or of land. The disastrous system of compulsory paper-credit came to an end early in 1797.

Assignee in Bankruptcy, one of the persons officially appointed to manage a bankrupt estate for the benefit of the creditors, now called *trustee*. See BANKRUPTCY.

Assignment, in the law of England, is the name given to a conveyance by which the party making the assignment transfers or grants over a right not in possession, such as a bond, a debt, or other *chose in action* (q.v.). In England, according to the strict rule of the old common law, no such right could be assigned or granted over, because such a proceeding was thought to be an encouragement to litigation. The only exception to this general rule was in the case of the crown, which might always either grant or receive a *chose in action* by assignment. Now, however, the proceeding is in constant practice. The courts of equity used to make the rule itself give way to the expediency of facilitating the transfer of property by directly sanctioning the practice; and even in those of common law the application of the ancient principle was evaded. The Judicature Act, 1873, provides for the assignment of *choses in action* by writing; notice of the assignment must be given to the debtor. Mortgages may be assigned; indeed the right to make such a transfer is one of the properties of a mortgage security. Assignment is also the proper mode of assurance or conveyance for passing estates in reversion; and for passing leasehold estates for years, and other chattel property. The Statute of Frauds requires the assignment of a lease, or of a trust, to be made in writing; and the Real Property Amendment Act, 1845, provides that the assignment of a chattel interest in land (not being copyhold) shall be made by deed, unless the interest is one which might by law have been created without writing (as, for example, a lease for less than three years at a rack-rent). Copyright is assignable; indeed, by the 5 and 6 Vict. chap. 45, sect. 3, copyright is expressly given to the author and his assigns; but it is not required, like a patent right, to be in every case under the seal of the proprietor, it being enacted by section 13 of the same act that an assignment properly entered in the book of registry at Stationers' Hall shall be as effectual as if made by deed.

In regard to the right of assignment generally, it may be laid down that the property in things personal is transferable with absolute freedom; and if

they are assigned under a condition which is either repugnant to the gift itself, or against the policy of the law—such as a prohibition to dispose of the property assigned—the condition is void. There are some cases, however, where the right of alienation is, in respect of the incapacity of the owner, suspended; as to which it will be sufficient to remark that the law with respect to the disability of infants, insane persons, and persons under duress, applies in general to personal as well as to real property. A married woman, too, was at common law under an absolute incapacity to make any transfer of things personal; with the exception of her equitable interest in property settled in trust expressly for her separate use, the goods and chattels which she possessed at the time of marriage, or subsequently acquired, belonged, by the general rule of law, to her husband. But the Married Women's Property Acts have given to married women almost all the rights of disposition enjoyed by single women. There are also some few cases where, in respect of the nature of the interest itself, its alienation is absolutely prohibited. Thus, generally, the pay or half-pay of a military or naval officer, or the salary of an office of trust, is, on a principle of public policy, not assignable, the object being to secure to such persons, even against their own improvidence, the possession of those means which are essential to the maintenance of their station and the performance of their duties. The sale or transfer of public appointments themselves is also, in general, contrary to the policy of the law, and in most cases expressly prohibited. See Stephen's *Commentaries*, Book II. chap. iv.

An assignment of goods and chattels is frequently made by a Bill of Sale (q.v.). Bills of Exchange (q.v.) and Promissory Notes (q.v.) are assigned by indorsement.

The corresponding term in the Scotch law is *Assignment* (q.v.). But in that system, assignment is the legal and technical word for the transference of property in copyrights, patents, and registered vessels.

In the United States, assignment is of broader signification; it applies also to the transfer of real property by certain conveyance. In general, every right of property, real or personal, and every demand connected with a right of property, real or personal; and all *choses in action*, as bonds, notes, judgments, mortgages, debts, contracts, agreements, relating both to real and personal property, are assignable, and the assignment thereof will pass to the assignee a right of action in the name of such assignee against all parties liable to an action. Assignment carries with it all collateral securities held by the assignor for the collection of a debt or the fulfilment of a contract, and is subject to all the equities and charges which attached in the hands of the assignor. A personal trust, as the right of a master in his indentured apprentice, or the duties of a testamentary guardian, or the office of executor, trustee, &c., is not assignable. The validity of an assignment must be determined by the law of the state in which it was made, provided the thing assigned is subject of municipal or state law; but copyrights, patents, and government claims are governed by acts of congress. In general, assignments should be recorded in the office prescribed by law, or are void as against those claiming under subsequent assignments.

Assignment of Error. See ERROR and APPEAL.

Assigns, or in Scots law, ASSIGNEES, is the legal name given to parties in whose favour an Assignment or Assignment (q.v.) is made.

Assimilation is the process by which living organisms absorb nutriment and convert it into

part of their own substance, solid or liquid. See NUTRITION.

Assinibola, a Canadian district or territory within the limits of the North-west Territories, but formed by an order in Council in 1882. It lies to the west of Manitoba, is bounded on the south by the United States frontier, west (at 111° W.) by Alberta territory, north (at 52° N.) by the new territory of Saskatchewan. It has an area of about 95,000 sq. m.; is intersected by the Canadian Pacific Railway, by the Qu'appelle, South Saskatchewan, and Souris rivers; and contains the towns of Regina (the capital of the North-west) and Fort Pelly. The rich soil of the Qu'appelle Valley and other portions is especially suitable for wheat-growing. The climate is subject to extremes, ranging from 58° F. below zero in winter, to 106° above it in summer.

Assiniboine, a river of British North America, rising in 51° 40' N. lat., and 105° E. long. At Winnipeg it joins the Red River (q.v.), which discharges its waters into Lake Winnipeg. At a point 140 miles from its mouth, the Assiniboine is 230 feet broad, and its mean depth over 8 feet; its course measures about 400 miles. Its tributaries are the Little Souris, Qu'appelle, Rapid River or Little Saskatchewan, White Sand River, and Beaver Creek. The river gives name to a tribe of Indians, and to the district of Assinibola of the North-west Territories. There is steam communication between Winnipeg and Fort Ellice, a decayed post of the Hudson Bay Company, about 700 miles distant. Here the great North-western rail crosses the Assiniboine by a rude rope-ferry.

Assisi, a town of Central Italy, picturesquely situated on a steep hill, 14 miles S.E. of Perugia by rail. It is surrounded by walls, and overhanging by a lofty citadel in ruins. It is the birthplace of St Francis, who founded here in 1209 the mendicant order that bears his name. The monastery, one of the earliest specimens of Gothic architecture in Italy, was built in 1229. It has two Gothic churches, one surmounting the other, with frescoes and paintings by Cimabue, Giotto, and other masters; beneath, in a Doric crypt (1818), are the relics of St Francis. Assisi also possesses a cathedral of San Rufino and a church of Santa Maria, the latter built out of a temple of Minerva. Pop. (1881) 3705.

Assize. This word, literally signifying a 'sitting' or 'session,' is a term used in the principal European legal systems, and very much in the same senses in all. As is common with regard to most of our ancient legal technicality, the Latin language, in the first instance (*assiduo*), and then the French (*assis*), appears to have led to its introduction into the phraseology of the law of England, and, it may be added, also of Scotland, although in the latter country it has a more limited application in judicial procedure than in England, *assize* being in Scotland the old technical expression for a jury. In England, this word may also signify a jury, and it is sometimes used to denote an ordinance, decree, or law. But in modern practice, it is commonly applied to the sessions or sittings of the judges of the superior law-courts, held periodically in each county, for the purpose of administering civil and criminal justice. These courts came into use in room of ancient justices in eyre, *justiciarii itinere*. The Statute of *Nisi Prius*, in the time of Edward I., gave a general jurisdiction in civil business to the judges acting in land disputes under the Assize of Northampton in 1176. They are now appointed by commissions issued twice a year to the judges of the High Court of Justice, two judges being generally assigned to each circuit. These commissioners or judges of assize are sent twice in

every year on *cireuits* all round the kingdom to make inquiry into crimes committed in certain counties, and to hear and determine the same according to law, or to try certain civil and criminal cases which are ready for trial; and occasionally a third circuit is appointed in the course of the year, for the purpose of jail delivery. The *cireuits* (formerly eight) are, since 1875, seven in number—Northern, North-eastern, Midland, South-eastern, Oxford, Western, and North and South Wales; and in going them, the judges or commissioners sit by virtue of four several authorities: (1) The commission of the *peace*, which is much the same as No. 2; (2) A commission of *oyer and terminer*, which applies to cases where the indictment is found before the commissioners; (3) A commission of general *jail* delivery, which enables them to try all persons in prison or on bail. The other authority is (4) that of *nisi prius*, which empowers them to try all questions of fact issuing out of the courts at Westminster that are then ripe for trial by jury. These, by the ancient course of the courts, were usually appointed to be tried at Westminster in some Easter or Michaelmas term, by a jury returned from the county wherein the cause of action arose; but with this proviso, *nisi prius*, unless before the day fixed the judges should come into the county in question, which in modern times they have invariably done in the vacations preceding; so that the trial has always, in fact, taken place before these judges. And now the trial is allowed to take place without the use of any such words in the process of the court, and as a matter of course, before the judges sent under commission into the several counties. The circuit system, however, does not extend to London and Middlesex, which have instead courts of *nisi prius*, which are held before the chief or other judge of the superior courts for the trial of civil causes, at what are called the London and Westminster Sittings; and the establishment of the Central Criminal Court has sufficiently provided for the administration of criminal justice within these districts.

The circuit courts of Justiciary in Scotland very much resemble the assizes in England, and have, in criminal matters, very much the same jurisdiction; but in civil causes their authority is practically limited to the hearing of appeals from the Small Debt Courts, although civil trials by jury in the Court of Session are occasionally set down for circuit. Scotland is divided into three circuits, the North, South, and West. Formerly there were only two courts held in the year, with an additional court at Glasgow. In 1882 it was found necessary, by Act of Adjournment following on Order of Privy-council, to provide for three additional courts in Glasgow, and two additional at Perth, Dundee, and Aberdeen.

In the sense of an ordinance or law, the term *assize* has various applications, although chiefly in the more ancient systems of jurisprudence. Thus, the 'Assizes' of Jerusalem were a code of feudal laws for the kingdom of Jerusalem, formed in 1099 by an assembly of the Latin barons and of the clergy and laity under Godfrey of Bouillon. Then there were in England the Assize of Bread, the Assize of the Forest, the Assize of Clarendon. The word was often applied to particular action connected with land. In the criminal procedure of Scotland, the word *assize* was until recently the only technical term for the jury, and is still used in that sense. See JURY TRIAL.

Assmannshausen, a village on the Rhine, 3 miles below Rüdesheim, famous for the red and white wine which is produced on the slate-mountains in its vicinity. The red wine resembles Burgundy, and possesses a rare aromatic flavour. The choicest sort, which is preferred by connoisseurs to

all the other red wines of the Rhine, is cultivated in the ducal vineyards at Wiesbaden.

Associate Synod, ASSOCIATE PRESBYTERY, designations formerly adopted among certain dissenters from the Church of Scotland. See UNITED PRESBYTERIAN CHURCH.

Association. See CO-OPERATION; also, SOCIETIES, LEAGUE, COMPANY.

Association of Ideas. This is a phrase of great importance in the Philosophy of the Human Mind, as expressing, according to an important school of modern thinkers, the most pervading fact at the foundation of our intelligence. What is meant by Association of Ideas, may be thus illustrated: When we see the sky becoming overcast, we think of rain as about to follow, the notion of rain not having previously been present to our mind. When we hear the church-bells, we are apt to think of the crowds in the street, or of some of the other circumstances of public worship. When we pass a house, we are reminded of its occupier; and meeting a person we know, we may be carried in thought to his office, and from that to other persons holding the same office, and so on. If an object is before our eyes, as a mountain, we are said to receive an impression or sensation of it, in consequence of the actual presence of the thing; but it is possible for us to remember the mountain, or to have an idea of it, when far away from the reality, in which case there must be some power in the mind itself, different from the susceptibility to present objects, a power of retaining, reviving, or re-exciting those states at first induced by contact with the actual. Besides the sights, and sounds, and touches caused by contact with real things, we are greatly occupied with sights, sounds, and touches remembered, anticipated, or imagined, which is to live in a world of ideas; and it is in this world that the process termed Association has its sphere. The association between names and things comprehends one of the most extensive applications of the power in question.

The circumstances under which one idea brings forward another into the view are principally these two—viz. first, previous *proximity*; and second, *likeness*. The terms 'Contiguity' and 'Similarity' may be used to express them. The first is exemplified in the cases of association given above; for in most of those it will be found that the conjoined notions have been frequently in the view at the same time, in consequence of which they have, as it were, grown together, or become part of the same whole. Thus, we have often noticed the darkened sky followed by a shower; the two facts have occupied the attention simultaneously, and in virtue of some power belonging to our mental framework, they have cohered into an inseparable couple or aggregate in the mind. This is proximity, or contiguity. When one idea suggests another which was never in company with it before, it is generally through the force of some *likeness* between the two. We meet an old man in the street with a very peculiar face, which reminds us of the bust of Socrates. These two things had never accompanied one another in our mind before, and therefore it could not be the force of proximity that made the second to arise at the instigation of the first; but there was a certain amount of likeness between the old man's features and those of Socrates. Identification and comparison both imply that things are brought together by virtue of their similarity. The principle of proximity operates most in Memory, Habit, and Routine; similarity has to do with invention and originality, and is essential to the processes of Reason and Imagination.

Law of Contiguity.—The principle of association by proximity is not confined to ideas. Our mechanical habits are formed through the very same power of our constitution that enables us to recall or remember ideas. The taught movements of a soldier or of a skilled workman are connected together so firmly that one succeeds to another almost of its own accord. Everything of the nature of acquisition supposes a plastic property in the human system, giving permanent coherence to acts that have been performed together.

The following is a general statement of the law under consideration: Actions, Sensations, States of Feeling, and Ideas, occurring together, or in close succession, tend to grow together, or cohere in such a way that when any one of them is afterwards presented to the mind, the others are apt to arise.

And first, as to association of Actions, or voluntary movements. When we perform a train of movements without any further aid of the will than to commence the series, there must be a fixed connection between each and the one that follows, and this connection may be either instinctive or acquired. There are various cases of instinctive trains, such as the action of the heart, lungs, and intestines, and the movements of deglutition. When a morsel of food reaches the back part of the mouth, the muscles of the throat seize hold of it, and transmit it to the stomach, independent of our will. The connected movements in this case are provided for in the original structure of the nervous and muscular system. In walking, there is partly an instinctive tendency to alternate the limbs, and partly a confirming acquisition, the result of practice. But in those complicated operations that human beings are taught to execute in the various avocations of life, the associating principle is everything. The apparently simple and easy act of taking food is a complicated acquisition; in other words, an extensive group of associated movements, originally built up by slow degrees. A good example of the association of movements is furnished in our requirement of spoken language, as in committing to memory words, sayings, and passages of books.

When we proceed to Sensations and the Ideas, or subsequent traces, of Sensations, and take along with these the variety of our movements with their ideas, we find an unlimited scope for the associating principle. In the various mechanical acquirements, which include the whole of special handicraft industry and skill, as well as the use of the bodily members in the more general actions of daily life, there may be traced the linkings of actions with actions, or actions with sensations and ideas. The workman fabricating in wood, metal, or stone, acquires a firm connection between each aspect of the material and the muscular power to be applied to bring it one step nearer the desired form. The power of copying anything we see, as in writing, drawing, moulding, &c., when completely mastered, is made up of associations between a visible appearance, and the train of movements calculated to reproduce it. After practice, all this is done, as it is called, mechanically, or without those operations of considering, willing, and remembering directions, that are essential to the learner in a new art. In the greater number of crafts, the eye is the guiding sense to the operator, but not in all. Sometimes it is the ear, as in music. In other arts, the touch is the guiding sense, and in some, as in cookery, the taste and smell direct the operator. Each accomplished workman has in his mind many hundreds, not to say thousands, of couples or aggregates of definite movements with other movements and with sensations, contracted in the course of his apprenticeship to his calling.

If we inquire into the circumstances that favour and promote this extensive circle of acquisitions, we shall find in the first place, a natural activity of temperament to be a good basis of bodily acquirements. Another important circumstance is the acuteness or delicacy of the sense involved in the operation. The third consideration is the natural power of adhesive association belonging to the individual character. The fourth principal circumstance is the interest taken in the work, or the degree to which it engages the feelings of the learner.

A detailed exemplification of this great principle of our nature might be given through all the departments of the human intellect. The acquirements of speech, as already said, contain a wide range of instances. The adhesion of language is partly in the vocal organs, partly in the ear, and partly in the eye, when we come to written and printed characters. The associations of names with things, with actions (as in obeying direction and command), and with other names (in acquiring foreign languages), are a gradual growth favoured by such conditions as the above. The acquirements in Science, Fine Art, and Business, and in everything that constitutes skill or knowledge, proceed upon this plastic property of the mind. It also enlarges the sphere of our pleasures and pains. There are connections established in the mind between our states of feeling and the things that have often accompanied them, so that the accompaniment shall have power to revive the feeling. It is thus that we contract affections, both benevolent and malevolent, towards persons and things, our friends, our home, our country, our property, our pursuits.

Law of Similarity.—This may be expressed as follows: Present Actions, Sensations, Thoughts, and Emotions tend to revive their like among previous impressions.

If the mind worked only by the principle of contiguity, nothing would ever occur to us except in some connection already formed. But some explanation is necessary as to the precise relationship subsisting between the two distinct forces of mental resuscitation, in order to show at once their distinctness and their connection. When the cohesive link between any two contiguous actions, sensations, or ideas is confirmed by a new occurrence or repetition, it is perfectly obvious that the present impression must revive the sum total of the past impressions, or reinstate the whole mental condition left on the occasion immediately preceding. Thus, if we are disciplining ourselves in the act of drawing a round figure with the hand, any present effort must recall the state of the muscular and nervous action, or the precise bent acquired at the end of the previous effort, while that effort had to restore the condition at the end of the one preceding, and so on. But this reinstatement of a former condition by a present act of the same kind, is really and truly a case of the principle before us, or of like recalling like; and without such recall, the progressive adhesion of contiguous things would be impossible. It would appear, therefore, that similarity is tacitly assumed in the operation of contiguity, and is indispensable to the process by which our acquisitions are gradually built up. Why, then, do we set up the associating force of likeness as something independent and distinct? To answer this question, we must advert to the fact that in those cases where the same impression is deepened by every new repetition, the old and the new are not merely similar, they are *identical*, and the resuscitation takes place without fail, and as a matter of course. But in going deeper into the explanation of the human intellect, we encounter many classes of similars, where there is not absolute identity, but the mixing up of a certain amount of *diversity* with the likeness actually existing. The botanist classing

together all the plants of the same order, as, for example, the *Rosaceæ*, has to be struck with the occurrence of certain common characters—viz. the properties that distinguish the order—in the midst of great varieties in all other respects. It is exceedingly important in science, in the business of life, and even in the creations of fine art, that the mind should take cognisance of likeness surrounded by unlikeness; which is the case that renders it necessary to characterise as distinct the associating force now under discussion. In the case of perfect identity between a present and a past impression, the past is recovered, and fused with the present, instantaneously and surely. So quick and certain is the process that we lose sight of it altogether; we are scarcely made aware of the existence of an associating link of similarity under such circumstances. But when we pass from perfect to imperfect or partial identity, we are more readily led to perceive the existence of this link of attraction between similars, for we find that the restoration sometimes does not take place. When in some new presentation of an object, the old familiar form is muffled, obscured, distorted, disguised, or in any way altered, it is just a chance if we recognise it.

The intellectual operations known under the names Classification, Generalisation, Induction, and Deduction, all proceed upon the discovery of likeness among things lying wide asunder in space and time, and very often veiled by diversity. Thus, in order to include in one list all the species of the *rose*, botanists have had to trace the characters of the genus through its various members, wherever they occur, and under the greatest differences in every other respect. It takes a keen identifying faculty i.e. a strong natural tendency for the resurrection of like to meet like—to see the resemblance of some of these species to the rest. So in the process termed *induction*, by which a general law is arrived at by comparing instances of it everywhere, there must be an attraction of similars, in order to bring together in the mind the collection of particulars that the induction is based upon. Many of the greatest discoveries in science have turned on the identification of modes of action never before supposed the same, as when Franklin was struck with the resemblance between the atmospheric thunder and lightning and the phenomena of common electricity.

Another wide field for the operation of the same principle is the region of *illustrative comparisons*, whereby two things widely remote are brought together, in the view either to elucidate one another, or for the sake of ornament and poetic effect. Most men of genius in literature and poetry have contributed original illustrations, similes, metaphors, or comparisons in the course of their compositions. A mathematician is the most likely person to bring up comparisons from mathematics; a botanist is prepared to identify plants; a travelled man provides illustrations from foreign countries; a historian, from history. The sailor is notoriously rich in nautical similes and illustrations. When any one not specially versed in a subject is yet prone to draw upon it profusely in the way of comparison, we must then refer to great natural endowment as the sole explanation. (For the full treatment of this subject, see Bain on *The Senses and the Intellect*; Hamilton's *Reid*; Mill, in his *Examination of Hamilton*; and the works of Herbert Spencer.)

The earliest known attempt to lay down the laws whereby thought succeeds to thought, is that contained in Aristotle's treatise on Memory. He enumerates three different principles of mental resurrection—viz. Similarity, Contrariety, and Coadjacency. He has in this been followed by most other philosophers; but it is now generally

admitted that contrariety is not an independent associating force. When a thing suggests its opposite or contrary, it will be found that the two have been previously together in the mind, and have therefore acquired a mutual hold by contiguity. Contraries (black and white, health and sickness) have a natural inseparability; they are of the class of relatives like father and son, which imply each other necessarily, and have no meaning except by mutual reference. It requires no new principle of our constitution to account for suggestion in this particular case.

Hobbes recognised the principle of contiguity as the foundation of reminiscence; but the Aristotelian philosopher, Vives, who wrote in the 14th century, was the first to specify in minute detail the various circumstances that determine the adhesive bond of recollection. Hume enumerated resemblance, contiguity, and causation. Causation, however, is merely a case of contiguity; so also we may say of Order in Place, and Order in Time, which have been given as distinct principles.

ASSOCIATIONIST SCHOOL is a name for those psychologists who seek to explain all mental acquirements, and the most complicated intellectual processes, by laws substantially similar to those that determine simple reproduction—by association of ideas. Their position is, of course, strenuously denied by other schools of thought, including especially Kantians and what is often called the *a priori* school, who affirm that association in the widest sense of the word is inadequate to explain many fundamentally distinct mental processes. The term Association of Ideas was first used by Locke, but in a very limited reference; the most notable representatives of the Associationist School, which is almost exclusively English, are Hobbes, Hume, Hartley, Priestley, James Mill, Professor Bain, Herbert Spencer, and, in France, Condillac. Associationists differ a good deal amongst themselves—some, like Hartley, taking account only of contiguity, Spencer almost solely of similarity, and some insisting on contrast as a distinct principle. The preceding article, positing only two principles, represents Professor Bain's view. Herbert Spencer has moulded his form of the doctrine by his theory of evolution.

Assoilzie ('assoil,' 'absolve'), a Scots law term used in criminal cases, meaning 'to acquit.'

Assolant, ALFRED, French author, was born in 1827 at Anbunson, Creuse, and became a teacher in Paris. In 1852 he visited the United States, and on his return published some brilliant sketches, as *Scènes de la Vie des États-Unis* (1859). From his pen now came a long series of tales and novels, including *Bravac* (1859), *Marromir*, *Gabrielle de Chénecourt*, *Les Aventures du Capitaine Corcoran*, *François Buchanor*, *Pendragon* (1881). He was equally notable as a sarcastic and powerful journalist and political writer, bitterly assailing the empire and the opportunist republican government. He died in May 1886.

Assonance, in Prosody, is the correspondence of sound pronounced by a reiteration of the same accented vowel with different consonants, as in *niece* and *might*, *war* and *fall*, *note* and *shape*, *feel* and *need*. It is a kind of imperfect rhyme, or rather a substitute for rhyme, and is especially common in Spanish poetry. All the old French poetry also was marked by assonance, not rhyme. 'The rule of assonance,' says Marsh, 'requires the repetition of the same vowels in the assonant words, from the last accented vowel inclusive. Thus *man* and *hat*, *nation* and *traitor*, *penitent* and *reticence*, are assonant couples of words of one, two, and three syllables respectively.' In Spanish verse the assonance is generally introduced only in alternate verses or the

second of each complet. Assonant or vowel rhymes occur frequently in modern English poetry.

Assos, a ruined town on the Gulf of Edremid, from the still imposing remains of which the successful excavations, in 1881-83, of the American Institute of Archaeology have brought to light the agora, with senate-house and colonnade, a bath, theatre, gymnasium, statues of heroes, and seven Christian churches.

Assouan (also *Esuan*; the ancient *Syene*) is the southernmost city of Egypt proper, on the right bank of the Nile, and beside the first or lowest cataract. Near are the islands of Philæ and Elephantine. On the left bank are catacombs. There are some remains of the ancient city, as granite columns and part of a temple. In the neighbourhood are the famous granite quarries from which so many of the huge obelisks and colossal statues were cut to adorn the temples and palaces of ancient Egypt. From Syene, this kind of granite came to be known as *Syénite*. Pop. about 4000.

Assumpsit. In the English Courts of Common Law, a plaintiff might, in old time, fail to obtain justice if he could not bring his claim within one of the customary forms of action. The clerks in Chancery were therefore empowered by statute in 1285 to frame new writs 'on the case,' where the cause of action was in the nature of trespass. One of the new forms devised by the clerks was the action of assumpsit, wherein the plaintiff asserted that the defendant undertook (*assumpsit*) to do a certain act, and failed to fulfil his promise. Though in form an action for trespass, assumpsit was really an action arising out of contract; and it was extensively used in commercial and other cases. The Common Law Procedure Act, 1852, did away with the old forms of writ, and under the Judicature Acts all actions are now commenced by a writ of summons.

In the United States, assumpsit is the most common form of action. It is defined to be an action for the recovery of damages for the breach of a parol or simple contract; but in reality it is the form of action generally used for the recovery of any debt, or for the recovery of money in the hands of the defendant which in justice and equity belongs to the plaintiff. The essential is that there should be a privity of contract between the parties, either express or implied. The plaintiff may neglect the contract or waive a tort, and sue in general assumpsit, but generally a special agreement implies a special assumpsit; in the latter case, however, the promise must be proved. Assumpsit has in most of the older states by statute superseded all the common law forms of action. It is based upon the general equitable idea that what one ought to do he has assumed or promised or undertaken to do, and being equitable in its nature, takes the place of all other civil actions in those states in which the difference between equity and law has been abolished in practice, and but one form of civil action is recognised by statute.

Assumption, capital of Paraguay. See ASCENSION.

Assumption of the Virgin, a church festival instituted at the beginning of the 7th century in the East, and of the 9th in the West. In the 3d or 4th century we first meet with a Gnostic or Collyridian tradition, that, after the death of Mary, her soul and body were taken up to heaven by Christ and his angels. That legend was condemned by Pope Gelasius (494 A.D.), but, through a series of successful forgeries, it was fathered on SS. John, Athanasius, Augustine, and others, and by 590 was accepted as true by

Gregory of Tours. The festival is kept on the 15th of August.

Assurance. See INSURANCE.

Assurance, COMMON, is described by Blackstone as the legal evidence of the translation of property, whereby every man's estate is assured to him, and all controversies, doubts, and difficulties are either prevented or removed. For an account of these common assurances or conveyances, as they are generally termed, see DEED, and CONVEYANCE.

Assynt, Loch, a beautiful fresh-water lake of South-west Sutherland, 6½ miles E. of Lochinver. Lying 215 feet above sea-level, it has an extreme length and breadth of 6½ miles and ¾ mile. To the north of it rises Quinag (2653 feet); to the east, Benmore Assynt (3273); to the south, Caisp (2779) and Sulven (2399). To Ardyreck Castle, on a north-eastern promontory, the great Marquis of Montrose was brought a prisoner in 1650.

Assyria (called *Assur* in the Assyrian inscriptions, *Athura* in the Persian, and *Assura* in the Median) was the northernmost of the three great countries that occupied the Mesopotamian plain. It was bounded on the N. by the Niphates Mountains of Armenia; on the S. by Susiana and Babylonia; on the E. by Media; and on the W., according to some, by the Tigris, but more correctly by the watershed of the Euphrates, for many Assyrian ruins are found to the west of the Tigris. It was thus about 280 miles long from N. to S., and rather more than 150 broad from E. to W. This plain is diversified by mountain-chains on the north and east, and watered by the Tigris and its affluents, between two of which the Zab rivers lay the finest part of the country, called Adiabéné. As it was the boundary-land between the Semitic people and Iran, it became the scene of important political events. Its extraordinary fertility enabled it to support a large population. The high degree of prosperity and civilisation reached by its inhabitants in very early times is attested not only by ancient writers, but by the extensive ruins of mighty cities, by the canals and contrivances for irrigation, and by the numerous proofs furnished by recent excavations—of an acquaintance with the arts and sciences. The ruins of many cities are grouped around Nineveh; while lower down, the Tigris exhibits an almost unbroken line of ruins from Tekrit to Bagdad. Under the Mohammedans this fine country is now almost a desert.

History.—Ancient authorities differ widely from each other respecting the rise and progress, the extent and the duration, of the Assyrian empire. Berosus, a Greco-Chaldean priest at Babylon, who wrote about 268 B.C., and Herodotus, who there is strong reason to suspect did not visit Babylonia, as he claims to have done, differ widely from Ctesias of Cnidus, who was court-physician to the Persian king Artaxerxes Mnemon (405 B.C.); the latter, no doubt, writing from distorted Persian sources, Herodotus from the reports of Greco-Egyptian and Phœnician dragoonians. Berosus, who was a member of the caste of Chaldean scribes, and able to read the inscribed records in the Babylonian libraries, has hitherto met with very strong confirmation from the inscriptions.

In the Bible narrative we are told that Nineveh was founded from Babylonia: 'Out of that land (Babylonia) he (Nimrod) went forth into Assyria' (Gen. x. 11) - and this statement is fully confirmed by the results of recent explorations. The earliest inscriptions found on the bricks from Assur (*Kilek-Shergat*), the ancient capital, give to the first rulers of the land the Akkadian title of *Patesi* or 'high-priest of the city of Assur,' and to the city itself the Akkadian name of *Pad-bi-ki*. The next notice of Assyria does not occur until the Assyrian

king Pul or Tiglath-pileser II. invaded Palestine, and was bought off by Menahem, king of Israel (738 B.C.). In the same reign we find the Jewish king Jehoiachaz (Ahaz) becoming a vassal of the court of Assyria, and the tribes beyond Jordan carried away captive (734 B.C.). In 722 B.C. Samaria is captured by Sargon 'the Tartan,' who had usurped the throne from his weak master, Shalmaneser IV. The next reference to Assyria is that of the siege and capture of Jerusalem by Sargon (Isaiah, x. xi. xx.), and the siege of Ashdod (712-11 B.C.). This event is now proved to be distinct from the siege by Sennacherib in 701 B.C., which terminated apparently in a disaster for the Assyrian army. The last mention of Assyria is the record of the murder of Sennacherib by his sons in 681 B.C., and the accession of his faithful son Esar-haddon, the most powerful of all the Assyrian monarchs, for he carried his arms as far as the Mediterranean and conquered Egypt. Little credit is to be attached to the expedition of Holofernes recorded in the Book of Judith.

After this the empire appears to have gradually decayed, until at last, in the reign of Assur-bani-pal or Sardanapalus, or that of Esar-haddon II. (Sardanios), a league for its destruction was formed between Nabopolassar, governor of Babylon, and Cyaxares, king of Media, which was strengthened by the marriage of Nebuchadnezzar, son of the former, to Nitocris, daughter of the latter. The war and siege are said to have been interrupted by an invasion of the Scythians, which drew off Cyaxares; but at length Nineveh was taken and destroyed about 605 B.C., or, according to Rawlinson, 625. In the time of Darius Hystaspes, Assyria rebelled without success in conjunction with Media. In the time of Herodotus, the capital had ceased to exist; and when Xenophon passed it, the very name was forgot, though he testifies to the extent of the deserted city, and asserts the height of the ruined walls to be 150 feet. An inconsiderable town seems to have existed on its ruins in the reign of Claudius; and the last notice we have of Nineveh in the classics is in Tacitus.

The fanciful history related by Ctesias is now found to be based on distorted Græco-Persian traditions, and though the writer managed to make the ancient world give credit to him in preference to Herodotus, his work is now proved to be very untrustworthy. According to him, for thirty generations after Ninus, the kings led a life of luxury and indolence in their palace; the last of them, Sardanapalus, made a vigorous defence against Arbaces, the rebel governor of Media, but finding it impossible to defend Nineveh, he set fire to his palace, and burnt himself with all his treasures; this event took place 1306 years after Ninus. Now, the above account represents Nineveh to have perished nearly three centuries before the real date, which was about 606 B.C., and is utterly incompatible with Scripture. Herodotus assigns to the empire a duration of 520 years, and Berosus of 526. In order to reconcile these conflicting accounts, historians have supposed that Nineveh was twice destroyed, but this supposition is now generally rejected. However, that that part of Nineveh was actually destroyed by fire, is proved from the condition of the slabs and statues found in its ruins, which show the action of intense heat.

Assyria became a Median province, 606 B.C., and afterwards, in conjunction with Babylonia, formed one of the satrapies of the Persian empire. In 331 B.C., at Gaugamela, near Arbela, in Assyria, Alexander defeated Darius Codomannus. In 312 B.C. Assyria became part of the Kingdom of the Seleucidae, whose capital was Seleucia, on the Tigris. It was afterwards subject to the Parthian

kings, whose capital was Ctesiphon, and was more than once temporarily in possession of the Romans. When the Persian monarchy of the Sassanides was destroyed by the successors of Mohammed, Assyria was subject to the califs. Their seat was Bagdad from 762 A.D. till 1258. It has been under the Turks from 1638, at which period it was wrested from the Persians.

Monumental History.—The Babylonian monarchy was already growing old before the Assyrian began. The early rulers of Assur were mere governors appointed by the Babylonian kings. They gradually acquired more power until they managed to set up an independent kingdom at Assur (about 60 miles below the later capital, Nineveh), in the 17th or 16th century B.C. A constant border warfare was long kept up, though alliances were made from time to time, and even cemented by marriages, as when Burna-Buryas of Babylon married Muballitat-Serna, the daughter of Assur-ballit, about 1400 B.C. The first Assyrian king other than a *patesi* or viceroy, was Bel-kapkad. His rule extended along both sides of the Tigris, but, under his successors, the boundaries varied with the valour of each king. The kingdom first began to be powerful under Rimmon-nirari I. about 1320. His son Shalmaneser I. founded Calah, and his grandson Tiglath-Adar I. had become so powerful that he invaded Chaldaea and captured Babylon in the year 1280. His descendant in the direct line of kings was Tiglath-pileser I., about 1110, the real founder of the first Assyrian empire. The reign of this prince, Tiglath-pileser I., son of Assur-ris-ilim, forms the zenith of the early empire. He spread the dominion of Assyria over all Western Asia, from the frontiers of Elam to the shores of the Mediterranean, and from the slopes of the mountains of Armenia, the land of Urartu, to the shores of the Persian Gulf. He captured Babylon, Sippara, and Upiya (Opis), and reduced Chaldaea to the position of a tributary state. On the west he advanced as far as Khilikhli (Cilicia), defeating the Hittites and capturing their stronghold Carchemish, and receiving the homage of the people of Arvad and the cities of Northern Phœnicia. He repaired and enlarged the palace at Calah and the temple of Ana and Rimmon at Assur. The prince Assur-bel-kala, who succeeded his father in 1110, by his weakness as rapidly allowed the empire to fall into decay as his father by his energy had enlarged and consolidated it. For nearly two centuries Assyria sank below the horizon of Western Asiatic history, and became so weakened as to render tribute to the Vannic kings of Armenia. This period of decay is synchronous with the rise and rapid development of the Hebrew kingdom under David and his successors.

In 930 B.C. Assyria once more began to emerge from oblivion, and a new dynasty was founded by Assur-dan II., whose son Rimmon-nirari II. (911-889 B.C.), and great-grandson Assur-natsir-pal (883-858 B.C.), by a long series of cruel wars once more established the power of Assyria. All the old provinces of the former empire were recovered, and extensive annexations made in the regions to the north-east in Armenia and Kurdistan. During the period of the middle empire, the capital was removed from Assur to Calah (*Nimroud*), at the junction of the Tigris and Upper Zab (Lychnus), about 20 miles below Nineveh, where elaborate temples and palaces were erected by the kings. Assur-natsir-pal was succeeded in 858 B.C. by his son Shalmaneser II., whose annals are found inscribed on the famous Black Obelisk in the British Museum, and on the bulls and slabs from his palace at Calah. For more than thirty years he carried out year by year a series of campaigns which established the power of Assyria over all Western Asia.

His reign is, however, most important for the fact that during his rule the Assyrian and Hebrew annals are first brought in contact, and a valuable series of synchronisms established, which is maintained until the fall of both kingdoms. In the year 854 B.C. Shalmaneser defeated in the battle of Karkar, fought in the Orontes Valley, a powerful confederation of allied Syrian tribes, of which the chief leaders were Benhadad, king of Damascus, Irkhuleni, king of Hamath, and Ahab, king of Israel, the latter contributing 2000 chariots and 10,000 foot-soldiers. Again, in the eighteenth year of his reign, the Assyrian king invaded Syria, and defeated Hazael of Damascus in a battle fought on the heights of Hermon or Sheu'ir (Deut. iii. 9), and captured 1121 chariots and 470 carriages. He then besieged and captured Damascus, destroying the beautiful garden which then as now fringed the city, and after marching into the Hamran, where he destroyed many cities, he returned and held a tribute 'durbur' at Beyrout, near to which city his statue is carved on the rocks at the mouth of the Nahr-el-Kelb. Here he received tribute from the Tyrians, Sidonians, and *Yahu'abil Khūmri*, 'Jehu, the son of Omri.' To the Assyrians Samaria was known as *Bit Khūmri*, 'the house of Omri,' and so Jehu was regarded as one of the line of Omri. The tribute paid on this occasion indicates the wealthy condition of the Israelite capital; 'silver, gold, a bowl of gold, cups of gold, pitchers of gold, and a sceptre for the king's hand.' The reign of Samas-Rimmon II. (823-810 B.C.), the son of Shalmaneser, who succeeded to the throne after a rebellion and civil war lasting two years, added largely to the eastern provinces, and the Assyrians came for the first time in contact with the Aryan invaders who were advancing from the north-east.

In the year 763 B.C. the Assyrian eponym canon records the observation of a solar eclipse in the month Sivan, which is now identified as that of the 15th of June. This eclipse forms the pivot-point on which Assyrian chronology turns. The empire now began to display signs of weakness, and when Assur-nirari ascended the throne in 753 B.C. there were many indications of a spirit of revolt. This is indicated by the statements in the eponym canon. Arpad in Syria revolted, and for four years the army remained at home, owing no doubt to the disturbed state of the country. An attempt was then made to repress the revolts in Namri or Kurdistan, which apparently failed, for in the year 746 B.C. we have a revolt in Calah, which indicates a rebellion of the army, followed by the usurpation of the throne in 745 by Pul or Pul, a Babylonian who assumed the Assyrian name of Tiglath-pileser II. Like his early namesake, he proved the saviour of the nation, and at once instituted an entirely new system of government of the provinces of the empire. In former times it was conquest and spoil rather than annexation and annual revenue that formed the policy of the rulers of Assyria. Tiglath-pileser II., however, introduced a new system into the government, that of centralisation. Conquered districts were now annexed and became satrapies ruled by Assyrian officials, and responsible for a fixed yearly revenue to the central government. The leaders of the national party in these regions were removed to Assyria, and their place supplied by bands of colonists from other regions, as in the case of Samaria, Arpad, and Hamath. Another great aim of the new sovereign was the control of the great commercial centres in Western Asia. Thus Carchemish and the cities of Phœnicia were objects of campaigns to secure the trade-route through Syria. In 742 B.C. Arpad revolted and was besieged two years by the Assyrians, and its subsequent fall brought about the conquest of North Syria.

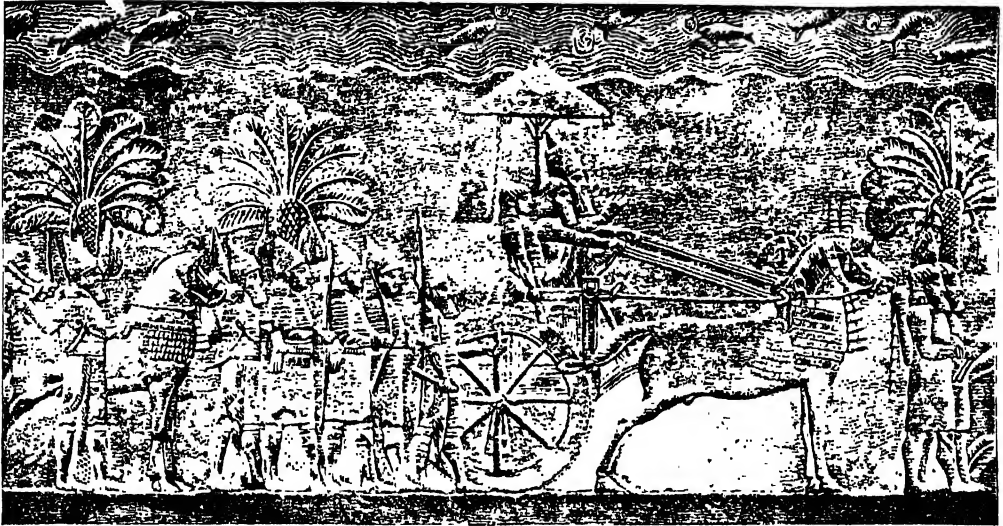
Hamath, then in alliance with Uzziyah, king of Judah, and whose king Eniel may have been, as Professor Sayce suggests, a Jewish nominee, was taken by storm, and the kings of Syria hastened then to pay homage to the conqueror. Among the names mentioned in the inscriptions we find Menahem, king of Samaria, Rezin of Syria (Damascus), Hiram of Tyre, Pisiris of Carchemish. This was the campaign referred to in the Scriptures (2 Kings, xv. 19), when Menahem gave a thousand talents of silver to Pul, king of Assyria. The successful war in Syria and Palestine was followed by campaigns in Armenia on the shores of Lake Van. The Assyrians next appear in Syria as the allies of Abaz, called Yahma-khazi or Jehoahaz by the Assyrian scribes. The result of this campaign was the siege of Damascus, and the ravaging of the kingdoms east of Jordan. The fall of Damascus made Syria a province of the court of Nineveh, and the tribute-lists discovered by Sir Henry Layard at Nineveh show Carchemish, Damascus, Arpad, Arvad, Hamath, Tyre, Sidon, and Samaria as contributing a regular sum to the national revenue. Having reduced the west to submission, the Assyrian king now attacked Chaldaea, and after a severe war, commencing in 731 B.C., he defeated and slew Ukin-ziru, the Kinziros of the Canon of Ptolemy, and was proclaimed king of Sumir and Akkad in 729 B.C.

This important reign ended abruptly in 727 B.C., and a weak prince, Shalmaneser IV., of whom no inscriptions are extant, ascended the throne. He made an ineffectual attempt to capture Tyre, which had revolted, and during the siege either died or was murdered at the instigation of Sargon, 'the Tartan' or commander in chief of his army. The usurper continued the war in Syria, and in 720 B.C. captured Samaria and carried away 27,280 of the leading inhabitants, and placed them in the province of Gozan, near the Khabour, and in Media. The latter days of the reign of Tiglath-pileser II. evidently had been marked by a general revolt of the provinces, which Sargon had to reconquer; and in the battle of Raphia on the borders of Egypt, which terminated the war, he checked the advance of the Egyptians under Sabako. In 717 B.C. the Hittite capital, Carchemish, fell, and produced the rich spoil of 'eleven talents, thirty maneh of gold, and two thousand one hundred talents of silver.' All this time the intrigues of Merodach-baladan III. in Chaldaea were causing trouble, but the disturbed state of the other provinces still kept Sargon from the object he most desired—the conquest of Babylon. In order to delay the attack, Merodach-baladan sent his embassy to Hezekiah, and raised a revolt in Syria, in which Phœnicia, Moab, Edom, and Philistia, supported by the Egyptians, took part. Sargon besieged Jerusalem and burned Ashdod (Isaiah, xx. 1). Having quelled the revolt, Sargon invaded Babylonia, and after a terrible campaign captured the capital, Merodach-baladan taking refuge in flight, and was proclaimed king 710 B.C. Tablets dated in his reign as king of Babylon are preserved in the British Museum. Sargon built for himself a magnificent palace called *Dur Sargon*, 'Fort Sargon,' marked by the ruins at Khorsabad, about 15 miles from Nineveh. This palace was explored by M. Botta for the French government, and the fine sculptures from this site form one of the treasures of the Louvre. The bas-reliefs, sculptured figures, and architectural decorations of this palace show a new departure in Assyrian art, and indicate foreign influence. Sargon was killed during a revolt of the soldiers in the new palace on the 12th day of the month Ab (July) 705 B.C., when his son Sennacherib succeeded him. The annals of Sennacherib are only known to us for eight years of

his reign. The Babylonian revolt on the death of Sargon led to the return of Merodach-baladan, but nine months later he was defeated by the Assyrians in the battle of Kisu. At the same time a revolt broke out in Philistia, and the people of Ekron having deposed the Assyrian nominee Puli, sent him for security in chains to Hezekiah, king of Jerusalem, who placed him in prison. This brought on the Jewish king the vengeance of Sennacherib. Having conquered Phœnicia, he marched against Ekron, where he punished the chief priests and Philistine lords who had broken their oaths to Assyria, defeating the allies on the plain of Eltekeh, where they were aided by a strong contingent of Egyptian troops. He next

ravaged Judæa, capturing forty-six cities, chiefly in the hill-country, and then advanced to Jerusalem. Here he states he shut Hezekiah up in the capital 'like a bird in a cage.' There is no indication in the inscriptions how long this siege lasted, and the meagre account of this event in the campaign, and the remarkably abrupt termination of the account, seems to indicate that the siege terminated in a disaster to the Assyrian arms. The tribute paid by the king was sent by an envoy to Nineveh, not paid on the surrender of the city; and this, together with the fact that Sennacherib never again entered Palestine, seems to confirm the statements of the Hebrew writers.

The statement as to the murder of Sennacherib



Sennacherib at the head of his Army.
(Height, 38 inches - British Museum.)

by his sons meets with a most accurate confirmation from the inscriptions. In the Babylonian canon we are told that on the 20th of the month 'Abt (December) 681 B.C., the king was slain by his two elder sons, who were jealous of the favour shown to their younger brother Esar-haddon, who was at the time serving with the army. Seven weeks later, Esar-haddon overthrew his brothers, together with their ally Erimenas, king of Armenia, at Malatijeh in Cappadocia, entered Nineveh in triumph, and placed himself upon the throne. Though the most active general of his father, Esar-haddon was far more than a mere warrior. He possessed great political tact, and at once inaugurated a new policy with regard to the troublesome court of Babylon. He divided the court between Babylon and Nineveh, residing at the former place during the winter, the latter in the summer months. It was during one of these periods of the winter court at Babylon that Manasseh was brought prisoner (2 Chron. xxxiii. 11). A son of Merodach-baladan had attempted during the period of anarchy to seize the throne of Babylon, but being defeated, he fled to Elam, where he was put to death by the Elamite king, who wished to preserve the friendship of the king of Assyria. In 675 the Assyrian king commenced one of the most important wars in the whole period of Assyrian history—namely, that which resulted in the subjugation of the powerful kingdom of Egypt to the Assyrians, and left the ancient world under one rule for twenty years, thus first giving to the world the idea of universal empire. After the war had

waged with varied success for more than three years, the Assyrian king made one great effort to terminate it. A very powerful army left Nineveh the first day of the year, and took the road to Egypt. The march occupied three months, and on the Assyrians having reached the Egyptian strongholds, a series of battles was fought, resulting in the retreat of the Egyptians on Memphis, which was captured by the Assyrians on the 22d of Tammuz (June), whereupon King Tirhakah fled up the Nile. Esar-haddon returned by way of the coast of Syria, receiving *en route* the tributaries of the Phœnician and Greek kings of Cyprus, and the Philistine, Moabite, and Israelite rulers. In commemoration of this successful campaign, the king had his statue carved on the rocks at Baal-Rasi (Nar-el-Kelb), and an inscription recording the capture of Memphis engraved upon it. Before leaving Egypt the Assyrian king divided the newly conquered land into twenty satrapies, ruled by prefects subject to the court of Nineveh.

The Egyptians did not long remain quiet after the departure of the main body of the Assyrian army; for Tirhakah returned from the Upper Nile, and the Assyrian king had once more to prepare for a campaign in the Nile Valley. During his absence with the main body of the army in Egypt in the previous year, a revolt had been raised in Nineveh; so the king, to guard against the repetition, crowned Assur-bani-pal, the eldest of his four sons, king, and placed him on the throne to rule in Nineveh, 12th Iyyar (April) 669. Two years later, during the campaign, on 12th

Marchesvan (October), the warlike Esar-haddon died with the army. Assur-bani-pal had all the ambition, but he lacked the genius of his father. He was a generous patron of art and letters, and his reign was the culminating point of Assyrian splendour. He continued the Egyptian war, drove Tirhakah from Memphis to Thebes, which city he captured and stripped of its treasures. Phœnicia was next invaded, and Tyre captured, after a siege lasting some months. Campaigns in Elam and in Northern Arabia next occupied the army. The empire was now shaken by one of the most serious revolts raised against the government. Acting, probably, on the advice of his father, Assur-bani-pal had appointed his brother, Samsas-sum-yukin (the Samsuchinosis of the Canon of Ptolemy), viceroy of Babylon, who, taking advantage of the absence of the Assyrian armies in various lands, rose in revolt, aided by the Elamites, Arabs, and by the Egyptians under Psammetichos. The revolt lasted more than five years, and at last Babylon, Borsippa, Sippara, and Cuthah were besieged and taken, and fire, sword, and pestilence spread through the land. The rebellious prince burned himself in his palace with many of his followers.

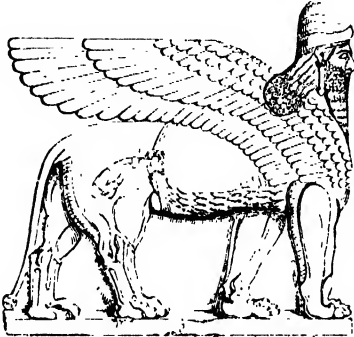
This revolt, however, shook the foundations of the empire, and soon the vast fabric began to totter. Egypt declared her independence, Syria was in revolt, Elam and the north-eastern provinces refused tribute, and Kandaham, the new viceroy of Babylon, proclaimed himself king, while his successor Nabopolassar, father of Nebuchadnezzar, openly threw off all semblance of his allegiance and declared himself king. Assur-etil-il-yukinni succeeded his father about 610. He rebuilt the palace of Calah, and bricks bearing his inscriptions have been found there. The last Assyrian king was Esar-haddon II. (the Sarakos) of Ctesias. There are some tablets relating to this prince which show that during his rule the north-east provinces were invaded by a powerful confederation of Aryan and Turanian tribes, Medes, Gimmerians, and Armenians, under the command of Kuztarit (Cyaxares). The meagre character of the inscriptions about this date, and the apparent number of claimants to the throne, indicate that after the death of Assur-bani-pal a period of disruption and anarchy set in, followed about 606 B.C. by the siege and destruction of Nineveh, after which Assyria became a Median province. The Mespila mentioned by Xenophon in the 'retreat of the Ten Thousand' was probably the Musapli of the inscriptions, 'the lower town'; the acropolis having been destroyed. The remains of Sassanian art found by explorers on the site indicate that the town was occupied then and in Roman times.

Chronology.—The chronology of the Assyrian empire now rests upon a very firm basis, being founded on several carefully prepared chronological inscriptions. The most important of these is the 'Eponym Canon,' a tablet containing a list of the archons, or eponyms of Nineveh or Calah, giving an exact chronology from 913-659 B.C. As each of these officials ruled in office only one year, the year was named after them; and as the date of the official year of Bursagali is fixed by a solar eclipse, the dates of all the officials can be ascertained. Fragments of seven copies of it were discovered by Sir Henry Rawlinson in 1862. An historical inscription of Rimmon-nirari I., dated on the side by the name of the eponym of the year, enables us to go back as far as 1330 B.C. A recent discovery has brought to light a table of Semitic Babylonian kings, arranged in dynasties, traced back as far as 2330 B.C. The dated contract tablets give us further help for the later dates. The parallel Assyrian inscriptions give much help in settling the chronology of Babylonia.

Government.—The government during the early and middle empires was a pure despotism and rule by force of conquest, held together by the obligations of tribute and homage; but no centralisation existed. In the reign of Tiglath-pileser II., an extensive system of central government with the accompaniment of bureaucracy was introduced. In conquered lands the native rulers were either removed and replaced by nominees from the Assyrian court, or a resident ambassador placed in the court. Tributary cities were ruled by prefects (*piklate*) and sub-prefects. Revenue was levied by collectors from all towns and districts, and an annual present from the native princes. In home government the Assyrians modelled their system on that of Babylonia. Taxes were levied on all produce from towns and villages, and tithes for the temple revenues. Special taxes were levied for the army, the river-flotilla, and the maintenance of the royal roadways. Justice was administered by appointed judges, the courts being held in the temples or in the city gate, with the right of direct appeal to the king. The king had absolute power over life and death, and offenders were treated with the greatest cruelty; impalement, decapitation, mutilation, and burning by fire, were the punishments inflicted. The king was feudal lord of all land, and could grant or take away any estates except those of the temples. Public works were carried out by *corvée* (forced bands of labourers) and captive-labour, provisions for the workmen being provided by the state.

Religion.—The religion of Assyria, though essentially of Babylonian origin, was much simpler, and though polytheistic in character, was free from the multitudinous pantheon of the more ancient empire. At the head of the pantheon was the god Assur, the national deity, always invoked first in the royal inscriptions, and regarded as the divine founder of the nation. He is called 'the holy one,' 'the glorious chief of the gods.' His name does not appear in the 'Chaldean Creation Tablet.' The Assyrian pantheon consisted of two principal triads, with numerous minor deities: (1) The *Nature triad*, whose birth is described in the Creation Tablet—*Ana*, 'the father of all the gods,' 'the Progenitor, who changes not the decree coming forth his mouth,' 'the lord of heaven,' 'the heaven.' *Bel*, the second member of the triad, is called 'lord of the world,' 'lord who protects the land,' 'he was the ruler of the earth. *Hea*, the third member, was one of the most important gods in the pantheon. He was 'lord of the sea, of rivers and fountains,' 'lord of wisdom and knowledge. (2) The *Celestial triad*.—This triad consisted of the moon-god, *Sin*, called the 'illuminator of earth,' 'the lord of waxing and waning,' 'the lord of laws.' The sun-god, called *Shamas*, 'the judge of heaven and earth,' 'the lord of light,' 'the driver away of evil.' The sun god was one of the gods most worshipped in the Assyrian pantheon; and the morning and evening hymns to this deity are among the most beautiful specimens of Assyrian sacred literature. *Istar*, the third member of this triad, was the goddess of the crescent moon, and the 'queen of the stars.' Strictly speaking, the goddess Istar was the only goddess in the Assyrian pantheon, and she assumes many and varied attributes. She was also 'queen of war and battle,' 'the archeress of the gods.' Among the minor divinities, the most important was the god Marduk or Merodach, the son of Hea. This god occupied a most important position; he was 'the mediator between gods and men,' 'the protector of mankind,' the 'god who raises the dead to life.' The goddess Zirat-baniit, the Suckoth-benoth of the Bible (2 Kings, xvii. 30), appears but little in the Assyrian inscriptions, though most

often invoked in those of Babylonia (q.v.). Next in importance was Nebo, the god of learning, and his consort Tasmituv. The libraries in Nineveh and other cities were all dedicated to this god, and the epithets applied to him indicate that he was the Assyrian Hermes. He is called 'the wise god,' 'the lord of illustrious birth,' 'the enlarger of the mind,' 'the writer of inscriptions.' Nergal (2 Kings, xvii, 30) and Nusku were the gods of war and hunting, and the former also the god of death, with the title of 'the great devourer,' to whom the winged lions at the temple or palace gates were



The god Nergal (British Museum).

dedicated. The two gods of Sepharvaim, Adrammelech and Anammelech, are to be identified with Adar-malik, 'the god of the noonday sun,' and Ann-malik, Ann, the father of the gods. Most of the other minor divinities were those worshipped principally in Babylonia. The religious ceremonies of Assyria bore a close resemblance to those of Babylonia, the temples being orientated to the north-east, and the holy place separated from the nave by a veil. The morning and evening sacrifice, the offering of cakes, wine, milk, and honey, are found in the liturgies of the temples. See BABYLONIA.

Ethnology.—The Assyrians, it is now generally acknowledged, were a branch of the Semitic family of nations, and therefore were members of the same grand division of the human race as the Syrians, the Phœnicians with their colonies, the Jews, and the modern Arabians. Long prior to the 21st century B.C., Semitism, as a distinct ethnic element, appears to have first established itself in Chaldaea. The races variously called Sythie, Turanian, or Tartar, appear to have once been spread over the whole space from the Caucasus to the Indian Ocean, and from the Mediterranean to the mouths of the Ganges. Their type of language has continued to our time to exist in the greater part of Asia, and in some of the remotest corners of Europe, as among the Finns, Lapps, Turks, and Hungarians. In Chaldaea they were the dominant race until about the 21st century, when the pressure of eastern invaders, Elamites, &c. forced the Semites from Chaldaea. Then seems to have commenced a series of migrations. Assur went forth probably at this time from Babylon to Assyria, Abraham and his followers to Palestine. From these seats, Semitism was afterwards carried to Cyprus, to the southern sea-board countries of Asia Minor, to Carthage, Sicily, Spain, and Western Africa.

The traditions of Assyria indicate a very early connection between Ethiopia, Arabia, and the cities on the Euphrates. Mesopotamia undoubtedly contained a large proportion of Arabs, and this accounts for the fact that Herodotus styles Sennacherib king of the Arabians and Assyrians.

The Chaldeans, colonies of whom were planted in Armenia by the Assyrian kings, were probably removed from the south. But the Sumirian-Akkadian races (see BABYLONIA) are now shown to have inhabited Babylonia from the remotest times, and by them the earliest civilisation in Mesopotamia was originated (see CUNEIFORM INSCRIPTIONS).

In language, Assyrian is clearly allied to the northern branch of the Semitic family. The vocabulary has a close affinity with Hebrew and Phœnician, while in the full development of the verbal conjugation, the use of numeration, and its richness of synonyms, it approaches nearer to the Arabic. The predominant features of the Assyrian ethnic type are Semitic, but modified by intermixture with Akkadian and other elements.

Literature and Civilisation.—One of the most important results of the explorations has been the discovery, in the palace of Assur-bani-pal at Nineveh, of a large library consisting of many thousand tablets, large numbers of which are now stored in the British Museum. This library, in all probability, owes its origin to the keen political insight of Esar-haddon, but was completed by his son Assur-bani-pal, whose name most of the tablets bear. In the colophon or docket attached to each tablet, the king says: 'The wise things of Nebo, all there was on tablets I wrote, I engraved, I explained, and, for the inspection of my people, in my palace I placed.' A careful study has been made of the tablets in this library, and it is evident it was chiefly composed of tablets copied from more ancient originals in the temple libraries of Chaldaea, each being stated to be 'like its old copy,' or 'like the ancient tablets of Sumir and Akkad.' That such was the case is now demonstrated by the discovery of duplicate copies in the libraries of Babylonian cities. The library was evidently founded to prevent the youth of Assyria from going to be taught at Babylon or Borsippa, where they would be subjected to dangerous political influences. Its educational character is shown by the discovery of a number of syllabaries, dictionaries, and text-books for instruction in the ancient Akkadian and Sumirian languages. These tablets, called by the Assyrians 'tablets to be with him' (handbooks), were the class-books of the students in Nineveh, and have been the medium by which the decipherers have learned the older languages of Chaldaea (Lenormant, *Études Accadiennes*). In this same section we find works on mathematics, tables of square and cube roots, as well as lists of plants, metals, and precious stones, animals and birds. The geographical works appear to be limited to lists of countries with their products, such as 'Lebanon cedar,' 'Elam horses,' 'Cilicia tin and silver,' and 'Arabia camels.' The section, however, which has been most prolific in discoveries has been that of poetic and mythological literature. In 1872 the late George Smith, of the British Museum, discovered a series of poetic legends relating to the great Chaldean hero Gilzhubar or Izdubar, the eleventh tablet of which contained a legend of the Deluge, very closely resembling the Hebrew account. This series of tablets was found to consist of twelve books of an epic poem, describing the labours of Gilzhubar, the various episodes of whose career are arranged according to the sun's passage through the signs of the zodiac, the Deluge tablet being the eleventh corresponding to the sign Aquarius. From three duplicate copies and numerous fragments, scholars have been able to obtain a nearly complete text of this important tablet, and the resemblances which it presents to the Hebrew narrative are even more striking than was at first recognised. The flood is sent as a punishment for sin; the builder

of the ark is called Samas-napisti, 'the living sun'; he gathers into the vessel all his male and female servants, and young men, and all the beasts of the field. The preparation of the ark occupies seven days, the rain lasts seven days, seven days are occupied in reaching the mount Nizir (safety). Here a sacrifice is offered, and the gods smelling the sweet savour, gather about the altar, and by the intercession of Hea the peace is restored, and a covenant made, and sealed by the appearance of the 'great bow, which Anu had created for his glory.' The resemblances are very striking; but there are also differences, especially local features, which show that the traditions are not copied from one another, but probably have a common origin in an older tradition. The discovery of these legends was followed shortly after by the discovery of an important series of cosmogonic legends. The close resemblance which they present to the Hebrew Genesis story is well illustrated by the first legend, which may be thus translated: 'When as yet the heavens were unnamed and below on earth a name was not recorded. The ocean the glorious was the father of them. The chaotic sea was the mother of them all. Their waters were joined in one. The darkness was not withdrawn (and) no flower had opened. When as yet the gods had not come forth any of them. By name they were not called. Order did not exist.' &c. The resemblance to the first chapter of Genesis is most remarkable, as also in the other fragments. The psalms, hymns, and prayers also are most poetic and beautiful in character.

Antiquities, &c.—The excavations carried out by Botta, Layard, Menant, Oppert, Rawlinson, George Smith, and Rassam near Mosul, Khorsabad, and Koyunjik, have led to many very interesting discoveries. The palaces and buildings that have been laid open are full of sculptures, all covered with inscriptions, in deciphering which considerable progress has been made, and more may be expected. Among the most remarkable monuments now in the British Museum are two winged human-headed lions, 12 feet high, and as many in length; winged human-headed bulls of the same dimensions as the lions; winged sphinxes; and the famous obelisk of black marble, sculptured on the four sides. On this last are represented a victory, a prisoner prostrate at the feet of the king, and foreign people offering tribute, and leading such animals as the Bactrian camel, elephant, lion, and rhinoceros—animals, with the exception of the lion, found in Asia only far east of the Tigris. The bas-reliefs are very numerous, exhibiting especially war and hunting. The march, the onset, the pursuit, the siege, the passage of rivers, the submission and treatment of captives, secretaries noting the number of heads taken in battle, and the amount of spoil; the chase of the lion, of the antelope, of the wild ass, and other animals—such are the favourite subjects of the Assyrian sculptor. Nor are they treated in the conventional style of Egypt, but in a manner which, for grace, spirit, correctness, and delicacy of execution, exceeds everything else known in Asiatic art. The artists sometimes follow modes of representation different from ours; for instance, a bull has five legs given him, in order that from all points of view he may be seen with four; a ladder stands edgewise against a side wall, to show it is not a pole. But a truthful impression is always aimed at, and it is this that gives these sculptures their value. The labour bestowed on the careful finish of a priest's dress, and on the tasteful decoration of an article of furniture, proves them to be the work of an ingenious and painstaking people. From the bas-reliefs we learn little about the private life of the Assyrians.

There are a few which represent the foddering cattle, women riding on mules, &c.

It is natural to expect that Nineveh—a wealthy and luxurious city—imported many of the products of other countries, yet the manufactured goods would mainly be of home production. The jars, bronzes, glass bottles, carved ornaments in ivory and mother-of-pearl, engraved gems, bells, earrings, arms, utensils, are of excellent workmanship. The ornaments especially are in good taste, and evince no inconsiderable skill in the working of metals. Transparent glass was not unknown, nor the use of the lens as a magnifying agent. The Assyrians knew the principle of the arch, the use of the lever and roller, and the construction of aqueducts and drains. In the arts of peace they appear to have been not inferior to any ancient nation; while their conquests, and the long duration of their empire, suffice to prove their capacity for war.

For the archaeology, see the books by Botta, Layard, Oppert, George Smith, and Perrot and Chipiez, *Chaldée et Assyrie* (1884), vol. ii. of their *Histoire de l'Art dans l'Antiquité* (Eng. trans. 1884). For the history, see Rawlinson, *The Five Great Monarchies of the Ancient Eastern World* (4 vols. 1862-67); Oppert, *Histoire des Empires de Chaldée et d'Assyrie d'après les Monuments* (1865); Lenormant, *Manuel d'Histoire ancienne de l'Orient* (3 vols. 1869); Ménaud, *Annales des Rois d'Assyrie* (1874); Maspero, *Histoire ancienne des Peuples de l'Orient* (1875, 4th ed. 1883); and Sayce, *Ancient Empires of the East* (1884). For the language, see the grammars of Sayce (1872 and 1875); his *Lectures on the Syllabary and Grammar* (1877); and the dictionaries of E. Norris (1868-72) and Delitzsch (1887). For the religion, see the comparative history by Tiele (2d ed. Amsterdam, 1870; French trans. 1882; English trans., vol. 1, 1884); and Sayce's *Hibbert Lectures* (1887). See also the following general books: Sayce's *Assyria: its Princes, Priests, and People* (1885); and *Fresh Light from the Ancient Monuments* (3d ed. 1886).

Astacus. See CRAYFISH and LOBSTER.

Astar'té, the Greek and Roman form of the name of the supreme female divinity of the Phœnicians. Like that of Baal, the corresponding male divinity, the name frequently occurs in the earlier books of the Old Testament in the plural form *Ashtoreth*, and indeed it is not till the time of Solomon that the singular form *Ashtoreth* occurs. This plural refers rather to different modifications of these deities than to different statues of Baal and Ashtoreth, as Gesenius explained it. The worship of this goddess extended wherever Phœnician colonies were founded, as at Cyprus and Carthage. The general notion symbolised in her attributes was that of productive power, as that of Baal was generative power. Hence, as the sun is the great symbol of the latter, the moon is of the former; and consequently we find the moon identified with Astarte, and the goddess represented horned like the crescent moon. By others she is supposed to be symbolised by the planet Venus, as was also the Greek Aphrodite, who was undoubtedly borrowed from the Phœnician Astarte. Gesenius, Fürst, and most Hebrew scholars, accept the etymology that identifies the name with our word *star* (Sanskrit, *stāra* for *stīra*; Zend, *stāraun*; Pehlvi, *setaran*; Gr. *astēr*; Lat. *stella*). It seems probable that she was at various times symbolised by either. At any rate it is clear that she was an astral deity, like most gods in the Phœnician pantheon, and that the things holy to her on earth were merely symbols, not dwelling-places. Astarte was the object of a sensual nature-worship, attended by many licentious rites and wild orgies. Ashtoreth is no other than the Assyrian Istar with a feminine termination, *th*, in accordance with the Phœnician idiom. The worship of Istar was less practised in Babylonia than in Assyria. Some of the legends of Babylonia make her the daughter of

sin, the moon-god, the Accadian Agu or Aeu; but others place her among the older gods, making her daughter of Ann, the sky. Considered as the evening star, she was known as Istar of Erech; as the morning star, she was identified with Anunit or Anat, the goddess of Accad. With the Accadians she had a separate and independent existence as a divinity, though she came to be considered by the Semites as but the consort and shadow of the god. She presided over love and war, as well as the chase. She was invoked as 'the queen of heaven,' and 'the queen of all the gods.' Her chief temples were at Erech, Nineveh, and Arbela. Carried through the Semitic world, she was identified with the sun-god Chemosh in Moab, became the Ashtoreth of the Canaanites, and appears in a somewhat different form as the Aphrodite of the Greeks, and the Artemis *poliquistos* of Ephesus. One of the most popular of Babylonian myths told how Istar had wedded the young and beautiful sun-god Tammuz, 'the only begotten,' and had descended into Hades in search of him when he had been slain by the boar's tusk of winter. The month of August was called by the Accadians 'the month of the errand of Istar'; while June was 'the month of Tammuz' of the Semites. This 'abomination' could be seen within the very precincts of the temple at Jerusalem (Ezek. viii. 14). She is also identical with the Egyptian Hathor, but it is difficult to say which of the two has the greater antiquity. The worship of Hathor, as Tiele points out, may be traced in Egypt long before the time when there was any possibility of Semitic influence, so that we may conclude either that Istar is the Egyptian Hathor in Semitic guise, or that both are forms, modified in accordance with varying national genius, of a goddess originally invoked under a similar name by the common forefathers of the Hamites and the Semites.

Astarte, a genus of Lamellibranch—i.e. bivalve—Molluscs, the type of a family, Astartidae, very closely allied to the Veneridae or Venus family. It is interesting chiefly on account of its history; for while only a few species now exist, and these limited to the northern oceans, the fossil species are extremely numerous (commencing with the *Lias* period), and are distributed over the whole world. The Astartidae were apparently to a large extent replaced by the Veneridae, which commenced with the oolitic period, and are now among the most abundant bivalve molluscs.

Astatic, 'without polarity' (from the Greek), used most frequently of a magnetic needle so arranged as to be unaffected by the earth's magnetism. This is managed by taking two magnetic needles, as nearly of the same intensity as possible, and placing them parallel to one another, with their poles in opposite directions. They thus neutralise one another, so as to be unaffected by the earth's magnetism, though they remain subject to galvanic action. This compound astatic needle forms the principal part of the astatic galvanometer.

Aster (Gr., 'a star,' from the form of the flowers), a genus of plants of the natural order Composite (q.v.) and sub-order Tubuliflorae. The genus contains a great number of species, both herbaceous and shrubby, and chiefly perennial, of which three-fourths are indigenous to North America, the remainder sparingly distributed over Europe and Northern Asia. One species only, *A. tripolium*, the Sea Starwort, is a native of Britain. It is common in salt marshes. A number of perennial species are in cultivation as garden flowers, of which the New-England Aster (*A. nova anglia*) and the Michaelmas Daisy (*A. tradescanti*), both natives of North America, are perhaps the most

common, and, with some of the other species, are prized as among the comparatively few flowers to be seen at that dull season when autumn is giving place to winter. But the best known and most valued of all the asters is the China Aster *A. (Callistephus) sinensis*: a summer annual, of which many varieties are in cultivation, and new ones are continually introduced. It was brought from China to France by a missionary in the 18th century, but has since been much improved and varied by culture, and all its florets have been rendered ligulate. The varieties exhibit great diversities of form and colour. The plant delights in a rich free soil. In the northern parts of Britain, the seed is generally sown in April in a hot-bed, or in pots under a frame, and the young asters are planted out in the open air in May. They flower from July to the end of autumn, and contribute much to the liveliness of the flower-garden.

Asterabad. See ASTRABAD.

Asteria, a variety of Sapphire (q.v.).

Asterias and Asteriade. See STAR-FISH.

Asterisk (Gr., 'a little star'), a sign or symbol (*) used in writing and printing, as a reference to a note at the bottom or on the margin of the page. The obelisk, or dagger (†), and many other marks, are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, &c. The asterisk often marks the omission of words or sentences, or it distinguishes words as conjectural or obscure, or it may be used merely as a typographical mark for any specified purpose.

Asteroids. See PLANETOLDS.

Asterolepis, a name given to what appears to have been the largest fish that lived in old red sandstone times in the European area. Its remains have been met with in Scotland and Russia. It was covered with a strong bony armour, embossed with star-like tubercles hence the name (Gr. *astēr*, 'a star'; *lepis*, 'a scale'). Its cuirass-like cephalic shield reached a length of 20 and a breadth of 16 inches. *Asterolepis* is supposed to have been from 20 to 30 feet long.

Asterophyllites (Gr., *astēr*, 'a star,' and *phyllon*, 'a leaf'), a general name, under which are included some abundant fossil plants of the coal-measures. The forms so designated are the fluted stems of *Calamites* (q.v.) (*Equisetum*), with slender branches springing from the joints, and bearing whorls of narrow-pointed leaves.

Asthma (Gr.) is a disease characterised by the occurrence of paroxysms, in which the breathing, previously natural, becomes difficult, and is accompanied by wheezing and a distressing sense of tightness in the chest. Asthma frequently appears at first after some inflammatory affection of the respiratory mucous membrane, but often without any such cause. It may begin at any age, but most often before ten. It is often clearly hereditary, affecting several members of the same family; and it may occur in families with a tendency to nervous diseases, e.g. epilepsy. The paroxysms are often preceded by premonitory symptoms—in some by great drowsiness; in others by extreme wakefulness and unusual mental activity and buoyancy of spirits; in at least one case by an attack of ophthalmia. The difficulty of breathing may become permanent in a lesser degree, with severe paroxysms at intervals.

The spasms may occur at any hour, but least often in the forenoon, most commonly between two and four in the morning. The causes inducing an attack vary greatly. In some, asthma only occurs with bronchitis, or with disorder of the stomach; in some it is brought on by particular odours, or

articles of food; in many, locality exerts most influence—e.g. they may suffer little in a smoky town, much in the country; or the reverse.

The asthmatic paroxysm is thus described by Dr Salter, the standard authority on this common but terrible disease: 'The patient goes to bed and sleeps two or three hours, becomes distressed in his breathing, and begins to wheeze, so as to waken those in adjoining rooms. He awakes, changes his position, falls asleep again and again, and the miserable fight between asthma and sleep may go on, till the increased suffering does not allow the patient longer to forget himself for a moment; he becomes wide awake, sits up in bed, throws himself forward, plants his elbows on his knees, and with fixed head and elevated shoulders, labours for breath like a dying man.' If the spasm is protracted, the oxygenation of his blood is imperfectly performed, owing to the scanty supply of air, and his extremities get cold and blue, but at the same time the violent muscular efforts at respiration in which all the extraordinary muscles of Respiration (q.v.) are called into action cover him with sweat. The pulse is always small. The chest enlarges during the paroxysm, but in it there is almost perfect stagnation of air. Alarming, however, as the attacks are, even to an onlooker, they are almost never fatal.

The symptoms of asthma are probably produced by spasmodic contraction of the muscular fibres surrounding the smaller bronchial tubes (see RESPIRATION); but they may be caused, at least in some cases, by temporary swelling of the bronchial mucous membrane, analogous to Nettle-rash (q.v.) on the skin.

During the occurrence of a paroxysm, the patient's clothes should be loosened, and he should be placed in such a position as will best assist him in his effort to breathe; to this his own sensations will generally guide him. The number of remedies recommended and sometimes useful during the attack, is itself a testimony to their uncertainty. A few of the most valuable are antimony or ipecacuanha in emetic doses; ether or very strong coffee; nitroglycerine in small doses; chloroform, transient in its effects, and to be used with caution; inhalations of oxygen; tobacco, stramonium, or lobelia smoked in the usual way, with inhalation of the smoke; blotting-paper impregnated with saltpetre and burnt.

A sufferer from asthma must avoid all causes which he finds apt to induce an attack; must attend carefully to his general health, and especially his digestive system; and may obtain much benefit from tonic and anti-spasmodic medicines. The selection of a suitable locality for residence procures for many sufferers relief or immunity. When asthma begins very early in life, it often passes off at or before maturity.

Asti (*Asta Pompeia*), a city of Piedmont, in the government of Alessandria, lies on the left bank of the Tanaro, 35 miles ESE. of Turin by rail. Pop. (1881) 17,340. It is a large town, with walls considerably dilapidated, and the streets generally very narrow and irregular. It has a large Gothic cathedral, which was completed about 1348, and a royal college. There is carried on a considerable trade in silk and woollen fabrics, hats, leather, and agricultural produce. The *vino d'Asti*, a kind of Muscatel (q.v.), is high, esteemed. The town is of high antiquity, having been famous for its pottery before its capture by the Gauls in 400 B.C. On the occasion of its being again taken and destroyed in an irruption of the Gauls, it was rebuilt by Pompey, and received the name of *Asta Pompeia*. In the middle ages, Asti was one of the most powerful republics of Upper Italy. It was captured and burnt by the Emperor

Frederick I. in 1155, and, after a series of vicissitudes, came into the possession of the Visconti of Naples; by them it was ceded to the French, in whose hands it remained till the middle of the 16th century, when the Dukes of Savoy acquired it. Alfieri was born here, 1749.

Astigmatism (from Gr. *a*, 'not;' *stigma*, 'a point'), a defective condition of the eye, in which rays proceeding to the eye from one point are not correctly brought to a focus at one point. In regular astigmatism (a congenital malformation), the curvature of the cornea is unequal in different meridians, those of greatest and least curvature being at right angles to each other. A spot of light is seen as a small oval, instead of a circle, as in a perfect eye; lines in one direction are seen clearly, while lines at right angles to these appear blurred. It can be remedied by the use of suitable glasses, whose surfaces are cylindrical, instead of being spherical like those of ordinary spectacles. Irregular astigmatism usually results from old injury or disease of the cornea, and can rarely be improved by glasses. See EYE.

Astley, PHILIP (1742-1814), theatrical manager, equestrian, and the best horse-tamer of his time, was trained as a cabinetmaker, served in General Elliot's regiment of light horse, and in 1770 started an exhibition of horsemanship in an open field at Lambeth. This was enlarged and improved at different periods, being burnt down in 1791 and 1803. In all, he constructed nineteen amphitheatres for equestrian performances, one of which was in Paris.

Astor, JOHN JACOB, millionaire, the founder of the 'American Fur Company,' was born in Germany near Heidelberg, in 1763. A peasant's son, he helped on his father's farm, until in his 16th year he went to London and worked with his brother, a maker of musical instruments. In 1783 he sailed to America, and by the advice of a dealer in furs whom he met on the voyage, invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired a fortune of \$250,000. Although the increasing influence of the English Fur Companies in North America was unfavourable to his plans, he now ventured to fit out two expeditions to the Oregon Territory—one by land, and one by sea—the purpose of which was to open up a regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the war of 1812 stopped its prosperity for a time. From this period Astor's commercial connections extended over the entire globe, and his ships were found in every sea. On his death at New York, 29th March 1848, he left property estimated at \$20,000,000, and a legacy of \$350,000 for the establishment of a public library in New York.—His wealth was mainly inherited by his son, WILLIAM (1792-1875), who continued to augment it till his death, when he is said to have left \$50,000,000. He added \$200,000 to his father's bequest for a public library. He was known as the 'landlord of New York,' from the extent of his property in that city.

Astorga, EMANUELE D', composer, born at Palermo in 1681, was the son of a baron of Sicily, who, for opposing the annexation of the island to Spain, was executed (1701) in the presence of his wife and son. Emanuele studied music in a Spanish monastery at Astorga in Leon, from which he derived his name, and whence in 1704 he was invited to the court of the Duke of Parma. His patron, erroneously suspecting that his daughter was receiving his addresses, sent him away to the court of the Emperor Leopold. Astorga died in a

monastery at Prague, 1736. His master-work is a *Stabat Mater* (ed. by R. Franz, Halle, 1864).

Astoria, originally a fur-trading station in Oregon, United States, on the left bank of the Columbia, founded by the Pacific Fur Company in 1811, and named from its chief proprietor, John Jacob Astor. It was a main point in the American claim to the territory of Oregon (q.v.). There are upwards of 50 large salmon-tinning establishments in the neighbourhood, in which thousands of men are employed during the fishing and packing season. The lumbering industry is also important. Pop. (1881) 2803. See Washington Irving's *Astoria* (1836).

Astrabad, a town in the north of Persia, at the foot of the Elburz Mountains, 30 miles SE. of the Caspian. It was long the residence of the Shah's ancestors, the Kajar princes, but owing to its remoteness the court was removed to Teheran; and since then its importance has declined, whilst the population is said to have dwindled from 75,000 in 1808 to 10,000 or even 5000.

Astræa, daughter of Zeus and Themis, or of Astræus and Eos (Aurora), was the last of all the goddesses to leave the earth when the golden age had passed away. She took her place in heaven as the constellation Virgo in the zodiac. Astræa is also the name of one of the Planetoids (q.v.).

Astræa. See CORAL, and MADREPORE.

Astragalus, a bone of the foot, which, by its convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os tarsi* or heel-bone. See FOOT.

Astragalus. See TRAGACANTH.

Astrakhan, a government in the SE. European Russia, watered by the Volga, washed on the SE. by the Caspian Sea. Area, 91,327 sq. m.; pop. (1881) 708,911. It is almost entirely a barren waste, the only fertile portions being along the Volga. Salt is procured from the marshes of the steppes, considerable numbers of cattle are reared, and fish are taken in the Volga, and sent to Nijni Novgorod. The climate is marked by its extremes, and the population by the variety of its nationalities.

ASTRAKHAN, its capital, and one of the chief towns of Russia, is situated on a high island in the Volga, 41 miles from its mouth in the Caspian Sea. It is surrounded by fruit-trees and vineyards, and consists of the fortress (Kreml), the White Town (Belogorod), and 16 suburbs (Sloboden). The Kreml and the White Town alone have houses of stone; the suburbs contain wooden buildings only, and irregular, dirty, and unpaved streets. Lengthwise through the middle of the city runs a canal which connects the Kutum arm of the Volga with the main stream. Of nearly 40 Greek churches, the finest is the cathedral (1696), on the highest point in the Kreml. Pop. (1830) 57,700, consisting of Russians, Armenians, Tartars, and Persians. Almost the entire commerce with Persia and Transcaucasia passes through the city. Its great markets attract every year many thousands of merchants, and its three bazaars are among the busiest marts in Europe or Asia. The city is connected by steamers with all parts of the Caspian, and is the principal harbour of that sea, although it is only when south winds raise the water that it can accommodate the largest vessels. The principal articles imported are wheat, barley, woollen stuffs, spirits, iron, tin, drugs, fruit, gold manufactures, raw silk, cotton, cotton yarn, and cotton fabrics. The industries are shipbuilding, dyeing, silk manufacture, shagreen-working, tallow-melting, seal-oil boiling, and

soap-making. The fisheries are of high importance, and rank amongst the greatest in the world. Enormous numbers of sturgeon are taken.—*Astrakhan* is the name of a fine description of fur, the produce of a variety of sheep found in Bokhara, Persia, and Syria.

Astral Spirits. The star (Gr. *astron*) and fire worship of the eastern religions rested on the doctrine that every heavenly body is animated by a pervading spirit, forming, as it were, its soul; and this doctrine passed into the religio-physical theories of the Greeks and Jews, and even into the Christian world. In the demonology or spirit-systems of Christendom in the middle ages, astral spirits are conceived of sometimes as fallen angels, sometimes as souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Their intercourse with men and their influence were variously represented, according to the notion formed of their nature. As the belief in spirits and witchcraft reached its height in the 15th century, the demonologists, or special students of this subject, systematised the strange fancies of that wild period; and astral spirits were made to occupy the first rank among evil or demoniacal spirits. Paracelsus, however, and others attributed to every human being an astral spirit, or sidereal element, in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies. Moreover, Paracelsus recognised astral or sidereal elements in matter. Astral salt was the basis of the solidity and incombustible parts of bodies; astral sulphur was the source of combustion and vegetation; astral mercury, of volatility and fluidity. These three elements were analogous to the three elements of man—body, soul, and spirit.

Astringents (Lat. *ad*, 'to,' and *stringo*, 'I bind'), medicines employed for the purpose of contracting the animal fibres and canals, so as to check fluxes, hemorrhage, and diarrhoea. The drugs most commonly used as astringents are alum, catechu, oakgalls, rhatany-root, &c. Many of the vegetable astringents owe that property, in whole or in great part, to tannin. A severe degree of cold is a powerful astringent.

Astrocaryum, a genus of American palms. See PALM.

Astrolabe (from two Greek words signifying 'to take the stars'), the name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the Armillary Sphere (q.v.), were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an astrolabe in the palmey days of astrology. It has been superseded by the more perfect instruments of modern astronomy. Chaucer published a learned *Treatise on the Astrolabe* in 1391, edited by Professor Skeat in 1872 for the 'Early English Text Society.'

Astrolabe Bay, a large inlet of the sea on the northern coast of the eastern portion of New Guinea, opposite the end of New Britain. The vegetation of the shores is luxuriant; a range of mountains, 14,000 feet high, bounds the view some 15 miles inland; the anchorage is exposed and insecure, and there are no practicable harbours.

Astrology (Gr. 'science of the stars') in early times was a comprehensive term for the study, both of the motions of the heavenly bodies, and of their supposed influence on human and terrestrial affairs. Now it has only the latter meaning, the term Astronomy having usurped the former. Astrology is one of the oldest superstitions, prevailing in very early times among the Egyptians,

Hindus, Chinese, Etruscans, and above all, the Chaldeans. Its rise may be regarded as produced by the impatient curiosity, and desire for harmony, of our race. Long ere any regularly operating laws were discerned in national or individual history, they could be seen in the more marked changes of material nature, among which the motions and influences of the heavenly bodies most conspicuously ranked. In the case of the sun, these ruled and vivified the earth. It was natural, then, to suppose that the overruling power which ordered the apparent chances of human life resided in the heavens, and that its decrees might be read there, the motions of the heavenly bodies proving, on trial, to be predictable. The astrology of the Egyptians was founded on solar theories. They connected each point of the sun's course with a stage of human existence. To them its rising, culmination, and gradual descent figured the progress of man's life in youth, maturity, and age. The Chaldeans, or Chaldaic-Babylonians, included in their system the other planets also. It was chiefly to their labours and fancies that the ancient world owed its astrology. Their name even became a synonym for astrologers, and continued long to be so, and on their system medieval astrology was principally founded. But their astrology was more noble in its conceptions than the degraded medieval and modern forms of the science. They considered the stars and planets not as the mechanical powers ruling men's destinies, but as a revelation of the Supreme Being. They held them as incarnations or emanations - sentient beings - proceeding from the absolute Being. Each planet was thus a visible deity. With this mythology, however, was gradually conjoined accurate observation of the motion of the heavenly bodies (see ASTRONOMY), producing a strange mixture of science and fantastic imagery. In Rome astrology found many adherents, though the educated were generally hostile; Cicero, the elder Pliny, and Tacitus declared against it. Seneca, however, believed in the influence of the stars on men; and astrology profoundly influenced the Alexandrian mystics and the Neoplatonists.

The spread of Christianity in the West, and later of Mohammedanism in the East, entirely altered the character of astrology. By both it was robbed of its polytheistic element. But the Arabs, as fatalists, found its tenets more congenial. Under the Califs Al Mansur and Albuazar it was diligently cultivated, and is still accepted by the Arabs everywhere. How inwrought in Mohammedan society it became may be seen by any student of the *Arabian Nights*. To Christianity it was less akin; though its influence appears in the beautiful story of the wise men of the East journeying to our Saviour's cradle. These were most probably Chaldean magi and astrologers. Some of the early fathers, however, accepted or modified the doctrine of astrology. Clemens Alexandrinus, Origen, and Augustine, all protest against it. By later church authority it was regarded as obnoxious, and several times publicly condemned. But by many zealous Catholics, and even churchmen, it was cultivated. Cardinal D'Ailly, in the 15th century, is said to have calculated the horoscope of Jesus Christ, and maintained the astrological predictability of the Deluge. Louis XI. of France, among his many superstitions, numbered also this, and maintained for long the astrologer Galeotti. Nostradamus (q.v.) was the great astrologer of the 16th century; during which, though the most learned and powerful minds continued to cultivate the science, it gradually declined from its former position of credit and power. It could not endure the double assault of the Reformation and its accompanying

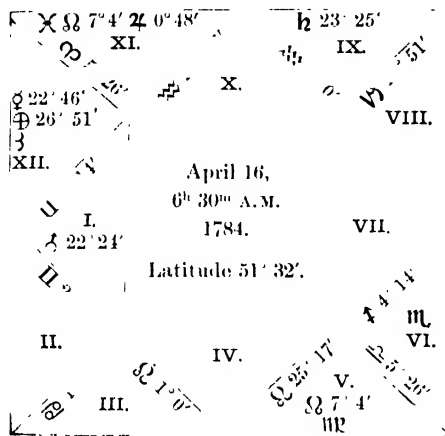
spirit of true scientific inquiry. Tycho Brahé, Kepler, and Cassendi represent well this stage in its history. Their own discoveries, with those of Copernicus and Galileo, sapped its foundations, though they could not shake off its influence on themselves. Protestant theologians like Melancthon cultivated the science. Paracelsus and Cardan combined astrology with alchemy and medicine. Burton, of the *Anatomy*, died about the date he had himself forecast. Robert Fludd and William Lilly in England represent the latest period of the public power of astrology. The latter especially is well known by his almanac, his prophecy of the great plague and fire of London, and his claim to foresee the fate of Charles I. He was even for a time pensioned by parliament for giving information. Dryden had his children's nativity reckoned. With Newton, astronomy emerged from mystery. His conceptions extended the terrestrial laws of the planets. The sun and stars - in his words, 'but great earths vehemently hot' - could no longer be viewed as rulers of destiny, and astrology thenceforth passed into the hands of quacks and pseudo-scientists, only an isolated effort being made here and there to rehabilitate it.

For great solitary minds, astrology has ever had an attraction. Wallenstein was a complete believer in it, and Napoleon I. often spoke of his star and his destiny, and through them was accessible to flattery. A modern astrologer declares that Napoleon and Wellington were born, the one under Saturn, the other under Jupiter, in the house of dignities. Hence Napoleon's dignities were misfortune to himself and others, Wellington's were beneficent, and finally superior. This astrologer was not a Frenchman. One of the last professed astrological authors of standing was Pfaff in Germany, who published his *Astrologie* in 1816. Amongst Parsees the wedding-day is fixed by an astrologer.

Natural astrology, the science by which the motions of the heavenly bodies were predicted so far as the knowledge of the time might allow, contained much of scientific value, and is now absorbed in Astronomy (q.v.).

The science of *judicial astrology*, which studies to predict terrestrial occurrences by means of the heavenly bodies, is simple. For its purposes the celestial sphere was divided into twelve sectors called 'houses of heaven.' The surface of a peeled orange appears divided in a manner which fairly represents these. Place the axis of the fruit horizontally in a north and south line, then the divisions of its surface will represent their position on the most common system. If its axis be incline! so as to point either to the pole of the equator or ecliptic, it will show the houses on other less common plans. These houses are supposed fixed, and the planets in their diurnal and orbital movements thus pass from one to another, traversing them all in a day. We shall use only the common system in explaining. On this, as the astrologer stood looking southward, he would have six houses dividing the visible heavens, in order from left to right, the horizon dividing these from the six below him. In three ways these houses differed. Their power depended on their *position*, the one containing the stars about to rise being most powerful. It was called the 'ascendant' (hence our expressions 'ascendency' and 'his star is in the ascendant'). Secondly, the houses differed in their subject matter, thus: (1) Life, (2) riches, (3) brethren, (4) parents, (5) children, (6) health, (7) marriage, (8) death, (9) religion, (10) dignities, (11) friends, (12) enemies. Thirdly, certain houses belonged to certain planets, which, when in them, had peculiar power. How the characteristics of a

house were summed up may be seen from the following description, taken, however, from a work founded on the *eclectic* scheme. 'Cancer (in this scheme the fourth house) is the sign of the tropic, particularly fruitful, but cold, watery, nocturnal, northerly, movable, weak, and mute. It is the house of the moon, and exaltation of Jupiter. It produces fair and pale complexions, round features, gray or mild blue eyes, weak voice, the superior portions of the body large, slender arms, and an effeminate constitution.' Three houses were assigned by the observer to each of the four ages of the person whose horoscope was drawn, and we can easily see how, having fixed the planetary configurations, he had the means of a pseudo-scientific prophecy at his disposal.



Usual Method, in drawing a Horoscope, of representing the Twelve Houses of Heaven.

From the above description it can also be seen how closely astrology was connected with physiognomy and observation of bodily appearance. Each planet in some schemes each house ruled certain parts of the world and of the human body, being thus productive or avertive of certain diseases, and specially ruling certain states. Mars was lord of iron and the blood. Aries ruled Great Britain, France, and Germany. A conjunction of Mars and Saturn (malignant in his influence) in Aries might then threaten war and pestilence to a great part of Europe. Gemini ruled the arms and shoulders. But different authorities, in a matter so much of fancy, differed much in assigning those properties, and fierce controversies have raged between them, now happily forgotten. Still, however, many accept this strange, but not unnatural, superstition. The astronomer royal is often annoyed by letters requesting him to draw the horoscope of children, or to help by the stars in finding lost property. Hence astrology is now a means of extracting money from the simple. The 'astrology man,' or sometimes 'woman,' still has a delineation of the zodiac in his darkened room, and conjures with it to the loss of curious servant girls and apprentices. *Zadkiel's Almanac* and the magazine *Urania*, by their existence show, too, that such credulity is not confined to the illiterate. But the chief interest of astrology to the educated is as an almost forgotten, but remarkable, development of the mind of man. Our everyday language, however, still testifies to the once widespread belief in astrology. We still speak of men as 'jovial,' or 'saturnine,' or 'mercurial' in temperament—an unconscious survival of a time when the planet under which a man was born per-

manently influenced his life. Jupiter or Jove was the joyfulest star, hence those born when he was in the ascendant were *jovial* and joyous; while those born under Saturn were *saturnine*, grave, and gloomy; and those under Mercury as *mercurial* and light-hearted as himself. The words 'disastrous,' 'ill-starred,' 'ascendency,' and 'influence,' as well as such phrases as 'born under a lucky star,' point in the same direction. Long after astrology ceased to be a belief, it retained its power over the imagination. Thus allusions to it are frequent in Milton, Ben Jonson, and their contemporaries, though its claim to being a real science was by that time generally discredited. It is interesting to see that even Chaucer in his later tales had come to think it a delusion, though in earlier years he must have been a devoted student of it, as is testified by his learned discussion of the subject in his *Treatise on the Astrolabe*, written for his son and published in 1391.

Readers will find further information in Christmas's *Cradle of the Twin-Giants—Science and History*; Robuck's *Astrology and Magic*; Zadkiel's *Handbook to Astrology*; Raphael's *Guide to Astrology*, and in the valuable work of M. Lenormant.

Astronomy (Gr. *astron*, 'a heavenly body;' *nomos*, 'a law') teaches whatever is known of the heavenly bodies.

The *history* of astronomy dates from a very early period. It is the most ancient of all the sciences. The Chinese, Hindus, Chaldeans, Egyptians, and even the Greeks, are known to have investigated the heavens very long before the Christian era. In China, astronomy was intimately associated with state politics; the Indians, Chaldeans, and Egyptians made it a matter of religion; and each of these nations applied it to astrological purposes.

The Chinese, Chaldeans, Hindus, and Egyptians each claim the honour of having been the first students of astronomy, and each have had advocates to support their claim. The *Tirvalore* tables (said by the Hindus to belong to an epoch 3102 years B.C.) are, so far as their date is concerned, altogether unreliable. A conjunction of the sun, moon, and planets, adduced to fix it, could not possibly have taken place at the time specified. Indeed, many contend that these tables are founded on science communicated to the people of India either by the Greeks or Arabians in much later times. Others maintain that they are original Hindii productions. The matter remains still somewhat uncertain.

The Chinese have astronomical annals claiming to go back 2857 years B.C. In these there is little record of anything but of the appearance of comets and solar eclipses; and regarding the latter phenomena, they tell nothing, save the fact and date of their occurrence. Professional astronomers were compelled to predict every eclipse under pain of death. The popular idea was, that an eclipse was a monster having evil designs on the sun, and it was customary to make a great noise, by shouting, beating of gongs, &c. in order to frighten it away from its solar prey. The many eclipses which the Chinese report have been recalculated, but not more than one anterior to the time of Ptolemy could be verified. At an early period, however, the Chinese appear to have been acquainted with the luni-solar cycle of nineteen years (introduced into Greece by Meton, and since known as the Metonic Cycle), and they had also divided the year into 365½ days. Solstitial observances are said to have been made by a gnomon in the 11th century B.C. To the burning of all scientific books by one of their princes (Tsin-Chi-Hong-Ti), 221 B.C., the Chinese attribute the loss of many theories, or methods previously in use. The precession of the equinoxes was not known to the Chinese until

400 A.D., but long prior to that they were familiar with the motion of the planets. They even record an observation of a conjunction of five planets, made between 2514 and 2436 B.C.

The mass of evidence seems in favour of the plains of Chaldea being the primal seat of observative astronomy. The risings and settings of the heavenly bodies and eclipses were subjects of observation and notation by their priests at a very remote period. Simplicius and Porphyry mention that Callisthenes, who had accompanied Alexander the Great to Babylon, on its conquest by that monarch, discovered there a catalogue of eclipses, recorded on tablets of baked clay, the earliest dating from 2234 B.C. These, by Alexander's orders, were sent to Aristotle. They are nearly all now lost, six only being preserved by Ptolemy, the earliest dated 720 B.C., and forming the first reliable observation we possess. The Chaldeans were genuine astronomers. They used different kinds of dials, invented the zodiac, gnomon, and clepsydra, divided the day into the hours we now use, and discovered the *Saros*, or cycle of about 18 years and 10 days, during which the moon makes 223 synodical revolutions, and eclipses recur in the same order for several cycles. They also were so exact in the orientation of their chief buildings, as to show no mean accuracy of observation. Their proficiency in arithmetic was probably due to their astronomical work.

The Egyptians, it is supposed, were the first instructors of the Greeks in astronomy. They do not, however, appear to have observed much for themselves. The meaning of what data they have left behind them can be guessed at only in a few instances. No mention is made by Ptolemy of the idea ascribed to them, that the planets Mercury and Venus moved round the sun; the probability therefore is, Ptolemy not being likely to overlook such a novel theory, that they entertained no such notion at the time of his visit, but that it is an after-thought of more recent ages. From the accuracy with which the great pyramid faces the cardinal points, it was probably used for astronomical purposes. It is designed on principles requiring much astronomical knowledge. But other pyramids do not show the same correctness of plan; and it is probable that the priests of Herodotus's time had lost the knowledge of their remote ancestors, for the information he received from them about the sun having risen thrice in the west, would seem to show the inaccuracy of their observation and weakness of their theorising power.

Up to this time, astronomy is little else than tradition. The Greeks have the honour of elevating it into a reliable history, and to the dignity of a science. Thales (640 B.C.), the founder of the Ionic school, laid the foundation of Greek astronomy. He it was who first propagated the theory of the earth's sphericity. The sphere is divided into five zones. He predicted the year of a great solar eclipse, but this it is now supposed he must have casually succeeded in doing—the Greeks at this time having no observations of their own to guide them—by means of the Chaldean *Saros* (above mentioned), which gives a regular recurrence of eclipses. He made the Greeks, who, prior to his time, were content to navigate their vessels by the Great Bear—a rough approximation to the north—acquainted with the Lesser Bear, a much better guide for the mariner. Among other things, he held that the stars were composed of fire, and that the earth was the centre of the universe. The successors of Thales held opinions which in many respects are wonderfully in accordance with modern ideas. Anaximander, it is said, held that the earth moved about its own axis, and that the moon's light was reflected from the sun. To him

is also attributed, on somewhat slender authority, the belief in the idea of the plurality of worlds. Anaxagoras, who transferred the Ionic school from Miletus to Athens, is said to have offered a conjecture that, like the earth, the moon had habitations, hills, and valleys.

Pythagoras (500 B.C.), who was the next astronomer of eminence, was very far in advance of his predecessors. He promulgated, on grounds fanciful enough, the theory the truth of which, however, has been since established—that the sun is the centre of the planetary world, and that the earth circulates round it. Pythagoras also first taught that the morning and evening star were in reality one and the same planet. But his views met with little or no support from his successors until the time of Copernicus. Between Pythagoras and the advent of the Alexandrian school, nearly a couple of centuries later, the most prominent names in astronomical annals are those of Meton (432 B.C.), who introduced the luni-solar cycle, as already intimated, erected the first sun-dial at Athens, and in conjunction with Euctemon, observed a solstice there in the year 424 B.C.; Callippus (330 B.C.), who improved the Metonic cycle; Eudoxus of Cnidus (370 B.C.), who brought into Greece the year of 365½ days, and wrote some works on astronomy; and Nicetas of Syracuse, who is reported to have taught the diurnal motion of the earth on its axis.

The Alexandrian school, fostered by the Ptolemies, originated a connected series of observations relative to the constitution of the universe. The positions of the fixed stars were determined, the paths of the planets carefully traced, and the solar and lunar inequalities more accurately ascertained. Angular distances were measured with instruments suitable to the purpose, and calculated by trigonometrical methods, and ultimately the school of Alexandria presented to the world the first system of theoretical astronomy that had ever comprehended an entire plan of the celestial motions. The system we know to be false, and inferior to the Pythagorean notions; but it had the merit of being founded upon a long and patient observation of phenomena.

The most interesting circumstances connected with the early history of the Alexandrian school are the attempts made to determine the distance of the earth from the sun, and the magnitude of the terrestrial globe. Aristarchus of Samos, the pioneer of the Copernican system, as Humboldt calls him—was the author of an ingenious plan to ascertain the proportion of the moon's distance to that of the sun.

Among other eminent members of this school were Trinocharis and Aristyllus, who made the observations which, together with observations of his own, enabled Hipparchus (q.v.) to discover the precession of the equinoxes; and Eratosthenes (q.v.), who determined pretty accurately the obliquity of the ecliptic and the latitude of Alexandria (he also measured an arc of the meridian between Syene and Alexandria, thus determining roughly the size of the earth); and Autolyceus, whose books on astronomy are the earliest extant in the Greek language.

We now reach the greatest name in ancient astronomical science—that of Hipparchus of Bithynia (190–120 B.C.), and here may be said to begin the real written history of scientific astronomy; for not until his era were there facts correct enough and sufficient in number upon which to build a system. Hipparchus was at once a theorist, a mathematician, and an observer. He catalogued no less than 1081 stars. This is the first reliable catalogue we have. He discovered, as we have already mentioned, the precession of the

equinoxes; he determined with greater exactitude than his predecessors had done, the mean motion, as well as the inequality of the motion of the sun; and also the length of the year. He also determined the mean motion of the moon, her eccentricity, the equation of her centre, and the inclination of her orbit; and he suspected the inequality afterwards discovered by Ptolemy (the evection). He invented processes analogous to plane and spherical trigonometry, and was the first to use right ascensions and declinations, which he afterwards abandoned in favour of latitudes and longitudes.

For more than two centuries and a half after the demise of this indefatigable astronomer, we meet with no name of note. Ptolemy (130-150 A.D.) is the next who rises above the mass of mediocrities. Besides being a practical astronomer, he was accomplished as a musician, a geographer, and mathematician. His most important discovery in astronomy was the evection of the moon. He also was the first to point out atmospheric refraction. He extended and improved many of the theories of Hipparchus, and was the founder of the system known by his name, which was universally accepted as the true theory of the universe, until the researches of Copernicus exploded it. The Ptolemaic system, expounded in the *Great Collection*, or, as it was called by the Arabs, the *Almagest*—from which source most of our knowledge of Greek astronomy is derived—placed the earth immovable in the centre of the universe, making the entire heavens revolve round it in the course of twenty-four hours. See PROLEMAIC SYSTEM.

With Ptolemy closes the originality of the Greek school. His successors were men of no mark, confining themselves for the most part to astrology, or to comments on earlier writers. It is to the Arabs that we owe the next advances in astronomy. They commenced making observations 762 A.D., in the reign of the Calif Almansor, who gave great encouragement to science, as did also his successors, the 'good Haroun Al-Raschid' and Al Mamun, both of whom were themselves diligent students of astronomy. Under the latter a small arc of the meridian was measured in Mesopotamia. For four centuries the Arabs prosecuted the study of the science with assiduity, but they are chiefly meritorious as observers. They had little capacity for speculation, and throughout held the Greek theories in superstitious reverence. They, however, determined with much more accuracy than the Greeks had done the precession of the equinoxes, the obliquity of the ecliptic, and the solar eccentricity; and the length of the tropical year was ascertained within a few seconds of the truth. The most illustrious of the Arabian school were Albategnius or Al Batuni (880 A.D.), who discovered the motion of the solar apogee (see ANOMALISTIC YEAR), and who was also the first to make use of sines and versed sines instead of chords; he corrected the Greek observations, and was altogether the most distinguished observer between Hipparchus and the Copernican era; Ibn Yunis (1000 A.D.), an excellent mathematician, who made observations of great importance in determining the disturbances and eccentricities of Jupiter and Saturn; and Abul Wefn, who first employed tangents, cotangents, and secants, and possibly discovered the lunar variation.

In the northern part of Persia, an observatory was erected by a descendant of the renowned warrior Genghis Khan, where some tables were constructed by Nasir-Eddin Omar, a Persian astronomer, proposed a reformation of the calendar, which, if adopted, would have been more accurate than the Gregorian reform. And at Samarcand,

Ulugh Beg, a grandson of Timur, made in 1433 A.D. many observations, and the most correct catalogue of stars which, up to his time, had been published.

In the 13th century, astronomy was again introduced into Western Europe, the first translation from the *Almagest* being made under the Emperor Frederick II. of Germany, about 1230; and in 1252 an impulse was given to the science by the formation of astronomical tables under the auspices of Alfonso X. of Castile. An Englishman, named Holywood (Sacrobosco), in 1220 wrote a book of great repute in its day on the spheres, chiefly abridged from Ptolemy; and among others who did much to promote a taste for astronomy were Purbach (1460), Regiomontanus (John Muller), who died in 1476, and Wadtherus, a pupil of the latter, who made numerous observations of merit.

We now come to the illustrious name of Copernicus (1473-1543), to whom was reserved the honour and the danger of exploding the Ptolemaic idea, and of promulgating a correct though imperfect theory of the universe. His system is in some part a revival and systematic application of the opinions said to have been held by Pythagoras. It makes the sun the immovable centre of the universe, around which all the planets revolve in concentric orbits, Mercury and Venus within the earth's orbit, and all the other planets without it. In the Copernican theory there were many of the old notions which have since been exploded. See COPERNICUS, COPERNICAN SYSTEM.

Among the contemporaries of Copernicus were Reinhold, who constructed the Prutenic tables; Recorde, who was the first to write on astronomy in English; and Nonius, a Portuguese, who invented a method for dividing the circle. The study of astronomy was also much aided about this time by the liberality of the Landgrave of Hesse-Cassel, William IV.

Decidedly the most industrious observer and eminent practical astronomer from the time of the Arabs to the latter half of the 16th century was Tycho Brahe (1546-1601). Some discredit attaches to him on account of his repudiation of the Copernican system, but it should not be forgotten that in the time of Tycho that system was not supported by the conclusive evidence we now possess. Tycho's system, which made the sun move round the earth, and all the other planets round the sun, they moving with it round the earth, explained all natural phenomena then observed equally well, while it must have appeared more probable than the crude and, at that era, unDemonstrable theories of Copernicus. Tycho Brahe compiled a catalogue of 777 fixed stars, more perfect than any that had previously appeared. He made the first table of refractions, and discovered the variation and annual equation of the moon, the inequalities of the motion of the nodes, and the inclination of the lunar orbit, and rejected the trepidation of the precession, which had hitherto injuriously affected all tables. He also made some interesting cometary investigations.

To his researches are mainly due the discovery by Kepler (1571-1630) of those famous laws which have rendered his name immortal (see KEPLER). To Kepler is due the credit of divesting the Copernican system of its absurdities. He is also said to have had some notion of the law of gravitation.

Galileo Galilei (1564-1642) first applied the telescope (which he made from a general description of the instrument of Hans Lipperhey of Holland, who was the first inventor of the telescope) to the investigation of the heavens. He was rewarded by the discovery of the inequalities on the moon's surface. The important discoveries of the four satellites of Jupiter, the ring of Saturn—not

then distinctly recognised as a circle--the spots on the sun, and the crescent form of Venus, followed in quick succession. For propagating the Copernican doctrine of the world, Galileo incurred the displeasure of the priests, and was compelled by the Inquisition to retract his opinions. See GALILEO.

The next great epoch in the history of astronomy brings us to England and Newton (1642-1727). In the interval, practical astronomy had profited largely by the logarithms of Napier; the mathematical researches of Descartes; the work of Horrox, who ascribed the motion of the lunar apses to the disturbing influence of the sun, so far forestalling Newton, and observed the first recorded transit of Venus; the application of the telescope to the quadrant by Gascoigne, an Englishman, and afterwards by Anzoni and Picard; by Römer's discovery of the progressive motion, and measurement of the velocity, of light; by the invention of Vernier; and the application of the pendulum to clocks by Huygens, who also brought into use the spiral spring, and made some valuable observations on the ring and satellites of Saturn; as well as by the investigations of Norwood, Hooke, Hevelius, Gilbert, Leibnitz, and Dominicus Cassini, to the last of whom especially the scientific world owes much. Among a variety of other valuable observations and discoveries may be mentioned his thorough investigation of the zodiacal light, his determination of the rotations of Jupiter and Mars, and of the motions of Jupiter's satellites from their eclipses, his discovery of the dual character of Saturn's ring, and also of four of his satellites. Newton's fame rests upon his discovery of the law of gravitation, upon which the common belief is he was led to speculate by the fall of an apple. Newton announced his discovery in the *Principia* in 1687, which was briefly that every particle of matter is attracted by, or gravitates to, every other particle of matter, with a force inversely proportional to the squares of their distances. The first gleam of this grand conclusion is said to have so overpowered Newton that he had to suspend his calculations, and call in a friend to finish the few arithmetical computations that were incomplete. This discovery is perhaps the grandest effort of human genius of which we have any record. Newton also made the important discovery of the revolution of comets round the sun in conic sections, proved the earth's form to be an oblate spheroid, gave a theory of the moon and tides, invented fluxions, and wrote upon Optics.

While the foundations of physical astronomy were thus broadly laid by Newton, Flamsteed the first astronomer royal at Greenwich, to whom, until recently, scant justice has been done, and Halley were greatly improving and extending the practical department of the science. To the former we are indebted for numerous observations on the fixed stars, on planets, satellites, and comets, and for a catalogue of 2884 stars. His *Historia Cælestis*, published in 1725, formed a new era in sidereal astronomy. Dr Halley, who succeeded Flamsteed as astronomer royal, discovered the accelerated mean motion of the moon, and certain inequalities of Jupiter and Saturn, but he is most famed for his successful investigations into the motions and nature of comets. His successor was Dr Bradley, who, in the year of Newton's death, made the important discovery of the aberration of light, which furnishes the only direct and conclusive proof we have of the earth's annual motion. To him also we are indebted for our knowledge of the nutation of the earth's axis. He was, besides, an unwearied observer, and left behind him at his death upwards of 60,000 observations. Altogether, Bradley's is deservedly one of the most honoured names in modern astronomy. Dr Maskelyne, who

was appointed to the observatory after Bradley, originated the *Nautical Almanac*.

These three Greenwich observers (Flamsteed, Bradley, and Maskelyne) span with their labours (from 1676 to 1811) a period during which both practical and theoretical astronomy were greatly developed. The discovery of gravitation gave men power to reduce the wanderings of the moon and planets to order, while the accuracy of calculation demanded more correct observation and better instruments. Dollond, Bird, Harrison, and Graham, famous instrument-makers, provided the last, while the three above mentioned, together with Römer, Bianchini, Lacaille, Cassini, and others, made observations far more correct than any before. On these observations much was founded of important theory, and new problems in celestial mechanics were thus presented. In solving these, Euler, who generally investigated the planetary motions in his *Theoria Motuum*, and published solar and lunar tables; Clairaut, who improved the theory of the earth's figure, and investigated the motion of the lunar apogee; D'Alembert, who assisted in investigating the planetary theory, precession, nutation, and the earth's figure; Lalande, who treated the orbit of Halley's comet, and published his planetary tables; Lagrange, who discussed the lunar libration (applying first the principle of *virtual velocities*), the theory of Jupiter's satellites, and the attraction of spheroids, were all eminent workers. Greatest in this field, however, was the Marquis de Laplace. With his investigations on the solar system, Jupiter's satellites, Saturn's ring, the theory of tides, and above all his great work, the *Mécanique Céleste*, he brings us into the 19th century, and to something like the full development of theoretical astronomy.

How complete this had now become will be best seen by the manner of discovery of the planet Neptune. The motions of Uranus, the outermost then known planet, had been carefully watched since its discovery by Sir W. Herschel, and an orbit was speedily assigned it. For about fourteen years the planet kept to this path, and then began to *gain* on its predicted place, continuing to do so for about twenty-seven years, when it ceased to advance and soon began to fall behind, continuing steadily to do so. It was seen by Leverrier, a young French astronomer, and Adams, then a student at Cambridge, that these movements could be explained by the action of a planet exterior to Uranus, and they both independently tried to solve the problem thus presented, and indicate the disturbing planet's place. This problem could be solved so as to indicate *any* one of an infinite number of planets, each of which would produce the observed disturbance of Uranus. It was treated differently by the two investigators. Both assigned certain probable values to the distance and periodic time of the unknown body, which made their work possible. Each wrought out his solution, and found the elements of the unknown body's orbit. Adams sent word to Professor Challis of Cambridge, and Leverrier later advised Dr Galle of Berlin where to look for it. Dr Galle first saw it, on September 23, 1846, within a degree of Leverrier's calculated place, and three degrees of Adams's. It is true the planet was found to have a different orbit from that assigned by the calculators. Their planets were in fact not identical, nor were they the planet Neptune. But they must ever have credit for the sagacity and ability with which, aiming at so indefinite a target, they so nearly struck the centre.

But partly parallel to this advance of theoretical astronomy there had been an enormous development of physical astronomy, so that it practically became a new science. Sir W. Herschel discovered

double binary stars (see STARS), catalogued vast numbers of Nebulae (q.v.), and by new methods framed daring theories of the constitution of the universe and the stars. Earlier than Laplace he thought of the nebular hypothesis, since confirmed in many ways, and by his discoveries gave an impulse to the new work of determining the physical state of the heavenly bodies. His son, Sir John Herschel, did for the southern heavens what his father had for the north. Their giant reflecting telescopes, with the refractors of Fraunhofer, Merz, and Mahler of Munich, and the larger ones since constructed by Cooke, Grubb, Alvan Clark, and continental makers, enabled this work to go on. W. and O. Struve at Dorpat and Pulkowa, with a host of other observers, largely amateurs, carried on the observation of double stars. Beer and Madler, with Schmidt of Athens, mapped with great accuracy the surface of the moon. And the surface of the planets has been scrutinised, with some results in the case of Mars and Jupiter, by a multitude of telescopes, which have been so cheapened and improved as to have attracted to their use, especially in America, numbers of amateur workers. By the invention of the Spectroscope (q.v.), the investigation of the chemical constitution and physical state of the sun, stars, and nebulae, was rendered possible. Fraunhofer, Balfour Stewart, and Kirchhoff, all deserve mention in connection with this great discovery. By it the heavenly bodies have been shown to consist of similar matter to the earth; the constitution of many stars, their physical state and temperature, the causes of the variability of some, and the fresh outbursts of others, with their motions in the line of sight, have all been investigated with success. The sun, however, has been the chief field of triumph for spectroscopic astronomy. Its physical constitution, vast atmosphere, and enormous gaseous eruptions, have been observed, and the problems they raise so far solved. Young and Langley in America, Janssen in France, Secchi in Italy, Zollner in Germany, and Huggins and Lockyer in England, are leading names in solar research. It is in this field of physics that astonishing advances are now made even daily. Through it astronomy has largely absorbed into itself all the other sciences, and become so extensive that its history must henceforth be theirs. It has in turn assisted them all. Through the physical changes of the sun and planets, light has been thrown on the meteorology of the earth, on geology and chemistry, on electrical and magnetic science.

Photography has also played a prominent part in astronomy. Daily photographs of the sun's surface are now made in more than one observatory. The form and number of the spots on his surface (discovered to have a periodical increase and diminution in about eleven years, by Schwabe of Dessau) are thus continually recorded. The planets, stars, and even nebulae, have also been pictured by the camera, and vast fields opened for the future extension of the science. Dr Praper of New York, the brothers Henry of Paris, Captain Abney and Mr Common in England, have done good service in this field.

Since the beginning of the 19th century, there have been added to our solar system upwards of 300 Planetoids (q.v.) or asteroids. Ceres, the first seen of these, was discovered by Piazzi at Palermo on January 1, 1801. Their number has been increased almost monthly by the work of observers such as Peters (of Clinton, New York) and Palisa. On the nights of August 11 and 17, 1877, Professor Asaph Hall, using the great refractor of the United States Naval Observatory, Washington, discovered two satellites of the planet Mars, most minute and interesting bodies. Astro-

nomers now, too, look with interest for the results of the work of those lately charged with the use of the gigantic and perfect instruments of the Lick Observatory, California, which in effective power seem likely to surpass all their predecessors.

Branches of Astronomy.—Astronomy has three main divisions: practical astronomy, which deals with the observation of phenomena; theoretical astronomy, which treats of the real motions of the heavenly bodies; and physical astronomy, which regards their physical state, chemical constitution, and the configuration of their surface.

In practical astronomy, the errors of instruments and observations, the construction of observatories, and the division of the celestial sphere by the circles and points to which the positions of the stars are referred, have all to be considered.

Theoretical astronomy is the application to the explanation of the discoveries of practical astronomy of the law of gravitation.

Physical astronomy applies the sciences of terrestrial nature, by proper instruments, to the heavenly bodies, and has come to be really the great welding science of the universe.

The science is also otherwise divided into sidereal astronomy, treating of the stars and nebulae; solar physics, the study of the sun's physical state; selenography, the mapping of the moon; planetary astronomy, regarding the planets; meteoric astronomy, and other divisions, taking their name from the instruments used, or the subject investigated. Some of these have their practical, theoretical, and physical sides, as will be evident from their titles; but as yet they are scarcely all agreed on as separate departments.

According to the plan of this work, the detailed treatment of the extensive subject of astronomy falls to be given in the separate articles on the most important departments of investigation and instruments. The principal articles will be found under the following heads:

Aberration of Light.	Kepler's Laws.	Photography,
Acceleration.	Lat. and Long.	Celestial.
Almacantar.	Libration.	Planetoids.
Altazimuth.	Lunar Theory.	Planets.
Aphelion.	Meridian.	Precession.
Apsides.	Meteors.	Ptolemaic System.
Ascension, Right.	Moon.	Quadrant.
Comet.	Mural Circle	Satellites.
Constellation.	Nebulae	Scintillation.
Copernican System.	Nodes	Seasons.
Cycle.	Rotation.	Sextant.
Day.	Observatory.	Sidereal Clock.
Earth.	Occultation.	Solar System.
Eclipses.	Orbit.	Solstice.
Ecliptic.	Ortery.	Stars.
Elements.	Parallax.	Sun.
Equatorial Inst.	Penumbra.	Tides.
Equinoxes.	Perigee.	Transit Instrument.
Galaxy.	Perihelion.	Twilight.
Gravitation.	Period.	Year.
Harvest Moon.	Perturbation.	Zodiac
Horizon.	Phases.	Zodiacal Light.

Readers may consult for further information Chambers's *Astronomy*; Sir J. Herschel's *Outlines of Astronomy*; Lardner and Dunkin's *Handbook of Astronomy*; Newcomb's *Popular Astronomy*; Grant's *History of Physical Astronomy*; A. M. Clerke's *History of Astronomy during the 19th Century* (ed. 1887); Ball's *Story of the Heavens*; and Whewell's *History of the Inductive Sciences*.

Astruc, JEAN, a celebrated physician, born at Sarves, in Languedoc, March 19, 1684, died May 5, 1766. He studied medicine at Montpellier, where he afterwards succeeded Chirac as professor (1717). In 1731 he was appointed regius professor of Medicine at Paris, whither his lectures attracted students even from foreign countries. As a physician, his treatises on midwifery and kindred subjects were highly valued; but probably his most famous work was published at Brussels (1753) under the title of *Conjectures sur les Mémoires originaux, dont il paroît que Moysè s'est*

servi pour composer le Livre de la Genèse. By his distinction between the Elohist and Jehovistic sources of the account, he practically founded the school of modern criticism of the Pentateuch.

Ast'ur. See FALCONGÆ and GOSHAWK.

Asturias, or OVIEDO, a northern province of Spain, washed on the north by the Bay of Biscay. Area, 4091 sq. m.; pop. (1884) 579,794. The low hills of Leon and Old Castile rise gradually to the mountain-chain which forms the south boundary, and which is but a prolongation of the Pyrenean system. The northern slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The chief rivers are the Nalon, Navia, and Sella. Agriculture is the chief industry. The coasts have good fisheries, but poor harbours. Asturias abounds in rich mines, which as yet are indifferently wrought. The chief minerals of the province are copper, iron, lead, cobalt, arsenic, antimony, and coal of excellent quality. A railway from Gijon connects Asturias with Leon and the Spanish railway system. The chief towns are Gijon, Aviles, Ilanes, and Luarca. Oviedo (q.v.), the capital, has since 1833 given its name to the whole province. The eldest son of the Spanish king has the title of Prince of Asturias, professedly an imitation of the English Prince of Wales, having been taken at the solicitation of the Duke of Lancaster in 1388, when his daughter married the eldest son of Juan I.

The Romans had great difficulty in subduing Asturias, about 22 B.C. Later it offered an asylum to the Goths, whose prince, Pelayo, bravely withstood the Arabs (718 B.C.); his successors carried on the contest successfully, and became kings of Leon in the 10th century.

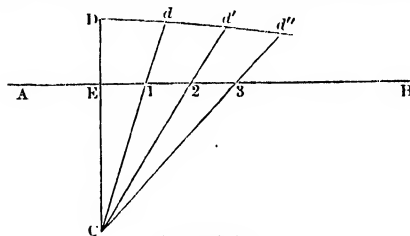
Astyages, son of Cyaxares, the last king of Media, reigned 594-559 B.C. In the latter year he was dethroned by Cyrus, who, according to Herodotus, was his grandson. An old tradition has it that Astyages, having no male heir, married his daughter, Mandane, to Spitames, a Median, whom he declared his successor, and so aroused the jealousy of the other great nobles; that the Persian Cyrus revolted in 559, and defeated Astyages, whom he took prisoner, but afterwards appointed governor of Hyrcania; and that Spitames was slain, and Mandane then became the wife of Cyrus. For Herodotus' account, which is probably nearer the truth, see CYRUS.

Asuncion, or ASSUMPTION, the capital of the South American republic of Paraguay, stands on a terrace skirting the left bank of the Paraguay River, and has connection by steamers with Buenos Ayres, and by a railway of 45 miles with Paraguari. It has a cathedral (1845) and a college. Its trade has recovered from the depressing effects of the war with Brazil in 1865-70; the principal articles of commerce being leather, tobacco, sugar, manioc, and maté or Paraguay tea. It was founded in 1537, on 15th August, the feast of the Assumption. Pop. (1857) 40,000; (1886) 22,000.

Asylum (Lat., from Gr. *asylon*, 'inviolable'), a sanctuary or place of refuge, such as a temple or church or their precincts, from which criminals, debtors, or persecuted persons could not be removed without sacrilege. See SANCTUARY, INSANITY.

Asymptote (Gr., 'not coinciding'), a line that continually approaches nearer and nearer to some curve, but only meets it at an infinite distance. An example of an asymptote will be seen under HYPERBOLA. As another illustration, let AB be a straight line which can be produced to any length towards B. Take any point, C, without the line,

and draw a perpendicular reaching to any distance, D, beyond the line; set off any equal distances, E-1, 1-2, 2-3, &c., along AB; and draw C1d, C2d', C3d'', &c., making 1d, 2d', 3d'', &c., equal to ED. Now it is evident that each of the points d, d', &c., is nearer to the line AB than the one to the



Asymptote.

left of it; if, therefore, a curve is traced through these points (the curve is called the *conchoid*), it must continually approach the line AB. On the other hand, it is evident that the curve can never meet AB at any finite distance; for a line drawn from C to any point in AB, however distant that point, must, when produced, cross AB. AB is thus an asymptote to the curve. To the senses, indeed, the curve and line soon become one, because all physical or sensible lines have breadth. It is only with regard to mathematical lines that the proposition is true; and the truth of it has to be conceived by an effort of pure reason, for it cannot be represented. An asymptote may also be curvilinear. For example, certain spirals have a circle as their asymptote. The spiral continually approaches the circle, but never meets it.

Atacama, the name, formerly, of two provinces, (1) Chilean and (2) Bolivian; most of the latter has, since the late war, been transferred to Chili. (1) A northern province of Chili, with an area of 39,400 sq. m., and a pop. (1885) of 76,566. About 1000 silver and 250 copper mines are worked, and gold is also found in considerable quantities. Salt deposits cover sometimes 50 sq. m. Copper, to the value of over £1,500,000 annually, is the chief export to England. Capital, Copiapo; pop. (1884) 10,374. - (2) The Bolivian department extended as far north as Peru, and east to Argentine Republic and the department of Potosi. In 1861 its area was put down as 70,181 sq. m., and its pop. as 5273. No trustworthy figures are published regarding the small portion, no longer a province, still retained by Bolivia; all that part of the district west of the Andes was ceded in 1884 to the Chileans, and formed into the department of Antofagasta, with an area of 60,770 sq. m., and a population stated (1885) at 21,213. The recently discovered mines of Caracoles are said to be the most productive silver-mines in the world. The former capital, Cobija (pop. 2380), was long the only port in the district; but the rival port of Antofagasta, founded in 1870, had by 1884 attained a population of 7946. - The *Desert of Atacama* extends through both provinces, but, since the war of 1879, has belonged entirely to Chili. From the steep, almost inaccessible coast, the land rises in rocky plateaus, broken at intervals by precipitous mountain-chains. Generally speaking, the soil is not at all sandy, but rocky; and the scanty rainfall of the district affords an additional reason for the growth of only the hardiest of desert plants, and for the frequency and extent of its dry salt-marshes. In the war it was treated as important, owing to its silver and salt-petre works, which have to some extent peopled its once desert solitudes.

Atacamite, an ore of copper, found in the iron-mines of Schwartzberg in Saxony, and also

as a crust on the lavas of Vesuvius and Etna, especially on those of Vesuvius erupted in the years 97, 1804, 1820, and 1822. It occurs abundantly in some parts of South America, as in Atacama, from which it derives its name, and other districts in Chili; and at Tarapaca (now also Chilian) it is associated in veins with ores of silver. The natural varieties of atacamite are crystallised, massive, and pulverulent or granular. The massive or compact variety is usually reniform, with a fibrous structure. The crystals are short and needle-shaped; the primary form is a rhombic prism or rectangular octahedron. It has been sometimes described as a chloride of copper, but incorrectly; and sometimes as a hydrochlorate (muriate) of copper: it is rather to be regarded as a combination of protoxide of copper with chloride of copper. It is a rich and productive ore, containing about 55 to 60 per cent. of copper. Atacamite often forms on the surface of copper exposed to the air or sea-water; and the greenish incrustation observed on antique bronze utensils, weapons, and other articles, and commonly known as the *acrujo nobilis*, is composed of this salt. On some antique bronzes from Egypt the atacamite is crystalline. Atacamite is worked in South America as an ore of copper; and considerable quantities are sent to England to have the metal extracted therefrom. See COPPER.

Atahualpa, last of the Incas, was the favourite son of Huayna Capac, who died in 1525. The mother of Atahualpa not being of the pure Inca blood, her son was formally excluded from inheriting the throne; but on his death-bed the father assigned to Atahualpa the kingdom of Quito (recently conquered), while Huascar, his eldest son, obtained Peru. After some years, Huascar demanded homage for the kingdom of Quito, and war was declared between the brothers. In 1532 Huascar was completely defeated near Cuzco and taken prisoner. In the meantime, the Spaniards had disembarked; and after a perilous march through the unknown country, Pizarro, at the head of his two hundred cavaliers, approached the victorious camp of Atahualpa. By a daring but diabolical stratagem, Pizarro obtained possession of the person of the king, who had come by invitation to visit him in a friendly spirit. While a priest was explaining the Christian religion, at a sudden signal, the mysterious firearms poured death into the terrified masses of Peruvians, and the Spanish cavalry rode them down with merciless fury. Atahualpa, made a captive, agreed to pay an enormous ransom; but was accused of plotting against Pizarro, tried, and condemned to be burnt. On his agreeing to be 'baptised,' his sentence was commuted to death by strangulation (1533).

Atalan'ta, the name of two heroines in Greek mythology, often confounded with each other. (1) The Arcadian Atalanta, daughter of Iasus and Clymene. At her birth she was exposed by her father, who had wished for a son, but she was suckled by a she-bear, and grew up to be a maiden-luttre of marvellous courage and skill. She slew the centaurs who pursued her, afterwards sailed with the Argonauts to Colchis, and took a prominent part in the chase of the Calydonian boar. She had many suitors, but was merciless in the conditions which she imposed on them. Being the swiftest of mortals, she offered to become the wife of him that should outstrip her—the penalty of defeat being death. At length she was conquered through stratagem by Milanion. He obtained from Venns a gift of three golden apples, which he dropped one after another during the race; and Atalanta was so charmed by their beauty, that she could not refrain from stooping to gather them,

and so lost the race. They were both metamorphosed into lions for having profaned the sacred grove of Zeus. Her story has been put into poetic form by Swinburne in his *Atalanta in Calydon*; and the race is the theme of a picture by Poynter. The same story is told of (2) the Boeotian Atalanta, daughter of Schœnus, but her husband was Hippomenes.

Ataman. See HETMAN.

Atavism (Lat. *atavus*, 'ancestor'), or REVERSION, is a term applied to the frequent appearance of ancestral, but not parental characteristics in an animal or plant. It is a commonplace that a boy 'takes after his grandfather,' and all organisms exhibit the same tendency to reproduce often remote ancestral characters. An occasional horse exhibits the long-lost stripes of the wild form; a blue pigeon, like the primitive *Columba livia*, sometimes turns up unexpectedly in a pure breed; or a cultivated flower reverts to the simpler and more normal type of the original wild plant. Even in detailed anatomical structure, a comparatively trivial character lost for many generations may suddenly reappear. Darwin has shown that reversion is greatly favoured by the disturbance to the organisation which results from crossing, while in other cases a return to more natural or primitive conditions of life brings about the ancestral variation. The possibilities of the variation are at once insured and limited by the summing up of the past history in the constitution of the germ, but the direct conditions which determine the particular modification are in many cases very obscure. See DARWINISM, HEREDITY, IN-SANITY, VARIATION, &c., and Darwin's *Animals and Plants under Domestication*.

Ataxy. LOCOMOTOR. See LOCOMOTOR ATAXY.

Atbara, a tributary of the Nile, rises in Abyssinia near Lake Tzana, flows mainly north-west, and after receiving the larger Takazze, joins the Nile below Berber—being the only tributary of the Nile below the junction of the White with the Blue Nile. For some months in the year its course is almost dry; but after the rainy season it is an important stream.

Atchafalaya, an outlet of the Red River or of the Mississippi, but receiving very little of the waters of the latter except in time of flood. It runs nearly southward to Chetumaches Lake, and after passing through it, reaches the Gulf of Mexico by Atchafalaya Bay after a course of about 220 miles. Its name means 'lost river,' and it is supposed to have been once the bed of the Red River.

Atcheen (also *Acheen* or *Atchin*; called by the Dutch *Atjeh*), until 1873 an independent state in the north-west part of Sumatra, now a province of the Dutch Indies, with an area of 6370 sq. m., and a pop. (1884) of 579,753. The surface is divided into an eastern and a western half by the mountain chain which traverses the whole island, and which rises in Abong Abong to 11,000 feet. On both sides are numerous stretches of level or undulating soil, watered by small but deep streams, and admirably adapted for arboriculture, gardening, and the cultivation of rice. The flora and fauna agree with those of Sumatra: pepper and areca-nuts are peculiar to Atcheen. The natives employ themselves in agriculture, cattle-rearing, trade, fisheries, weaving cloth, and working in gold, silver, and iron. In appearance, dress, character, and manners, they are distinct from the rest of the inhabitants of Sumatra. Of darker colour and lower stature than the latter, they are also more active and industrious, good seamen and soldiers; but they are treacherous, revengeful, bloodthirsty, immoral, and inordinately addicted

to opium. Their ethnological place is not yet settled; their speech, according to Van der Berg, belongs to the Polynesian family.

The capital of the government is Kota Radja or Atcheen, in the north-western extremity, situated on a stream navigable by boats, about 4½ miles from its port Oleh-leh, with which, since 1876, it has been connected by a railway. Formerly a large and flourishing city, it was almost entirely destroyed during the war, but is now beginning to revive. It contains a Dutch garrison of 2000 men.

During the earlier half of the 17th century Atcheen was a powerful sultanate, with supremacy over several islands and a part of the Malay Peninsula. Its power gradually declined; but an attempt was made by the treaty between the English and the Dutch in 1824 to reserve its independence. The inevitable war, however, broke out in 1873, and ended as inevitably, though not without a desperate resistance, in the conquest and annexation of the sultanate. The capital was carried by storm in 1874, and the final subjection of the whole country was carried out by General van der Heyden in 1879.

Atchison, a city of Kansas, U.S., on the left bank of the Missouri, 333 miles above St Louis. It is an important railway centre, nine distinct lines converging here. The city has flour-mills, an iron-foundry, machine shops, manufactures of furniture, carriages, and wagons, and an extensive general trade. It has grown rapidly. Pop. (1870) 7054; (1880) 15,106; (1890) fallen to 13,963.

Ate, according to Homer, the daughter of Zeus - of Eris, as Hesiod says - was a vengeful goddess, ever attending *dysnomia*, or transgression of law, though she herself prompted men to such. She was banished from Olympus by Zeus, whom she had incited to take an oath of which he subsequently repented. She then travelled to and fro over the earth with great rapidity, always intent on exercising a pernicious influence upon mankind. But her steps were followed by the goddesses *Litai* ('prayers'), benevolent daughters of Zeus, who healed those who had been afflicted by Ate. The tragic writers describe Ate as the goddess of retribution. Their representations almost identify her with Nemesis and Erinys. Of the greater tragedians she is most prominent in Æschylus, and least in Euripides, in whom the idea of *Dike* ('justice') is more fully developed.

Ateles. See SPIDER-MONKEY.

Ateliers Nationaux, or NATIONAL WORKSHOPS, was the name given to the works which were organised by the Provisional Government at Paris in the spring of 1848, after the downfall of Louis-Philippe, and which were intended to give occupation to the unemployed at that time of disturbance. A permanent department was established, called *The Committee of the Government for the Workmen*. This establishment acted on the doctrine that the workmen were entitled to have a living provided for them on a certain uniform scale, which was fixed at two francs per day. It should be said, however, that the works were mostly unproductive, and therefore a mere burden on the national revenue. Of the crowds which flocked for employment, both from Paris and the provinces, many could not be provided with work of any kind, and had a dole of one franc a day given them. By the time a regular government had been established at the beginning of May (1848), the numbers thus engaged had increased to 130,000. As it had become a serious tax on the revenue, the government proceeded to break up the *workshops*, a measure which kindled into flame the discontent fermenting in the capital. The armed insurrection of the lower

classes of Paris which ensued, was put down by the national forces under Cavaignac only after the terrible fighting of the *Days of June*. The *ateliers nationaux* are generally, but quite inaccurately, confounded with the *ateliers sociaux* of Louis Blanc (q.v.).

Atellana, *Fabula Atellana* (also styled *Ludi Osci*), a kind of popular drama in Rome, first introduced from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old *Fabula Atellana* were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama, although the character of both was to some extent the same. In the latter, satyrs figured; while the former personated real Oscan characters. The *Maccus* and *Bucco* of the *Fabula Atellana* may be considered the origin of the modern Italian *caricchino* (harlequin), and other characters of the same stamp. They were the favourite characters; spoke the Oscan dialect, and excited laughter by its quaint old-fashioned words and phrases. The *Atellana* were neither so dignified as the *comædii prætextati*, nor so low as the *comædia tabernaria*, but were characterised by a genial and decent drollery. The caricature was at first always pleasant, and though quizzical, it did not lapse into obscenity, like the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing caste, were allowed to take parts in the *Atellana*. They were commonly divided into five acts, between which were frequently inserted the *exodia*, old-fashioned and laughable interludes in verses. The latter also were played by young and well-born Romans. See the fragments collected after Bothe and Munk by Ribbeck in *Scenica Romanorum Poesis fragmenta* (2d ed. 2 vols. Leip. 1871-73). See also Munk, *De Fabulis Atellanis* (Leip. 1840).

Ateshga ('place of fire'), a spot about a mile in diameter, on the peninsula of Apsheron, on the west coast of the Caspian Sea. It is considered sacred by the Guebres, or Persian Fire worshippers, who still visit it in large numbers, and bow before the holy flames which issue from the bituminous soil. The site of a former temple of this sect is now occupied by large petroleum works, where the natural gas is utilised for fuel for the vast retorts.

Ates'sa, a town of South Italy, 23 miles SSE. of Chieti. It has a beautiful collegiate church. Pop. (1881) 5086.

Ateu'chus. See SCARABEUS.

Ath, or AVTH, a fortified town in the province of Hainault, Belgium, on the navigable Dender, 32 miles SW. of Brussels. It has a lofty tower dating from 1150, an arsenal, hospital, and college, important manufactures of linen, calicoes, lace, &c., and a brisk trade. Pop. (1883) 9394.

Athabasca (locally *La Biche*, 'red-deer or elk river'), a river and lake in the North-west Territory of the Canadian Dominion, forming part of the great basin of the Mackenzie. The river rises in the Rocky Mountains, in a little lake at the foot of Mount Brown, one of the highest points in the range. Its general course is NE., till, after crossing the west end of Lake Athabasca, it turns towards the NW., and unites with the Peace River, from beyond the Rocky Mountains, to form the Slave River, which, again, after passing through Great Slave Lake, takes the name of the Mackenzie. Length of the Athabasca, over 600 miles; or about 2000 miles for the entire river system. The Athabasca-Mackenzie affords magnificent facilities for navigation; and between it and

the Winnipeg system there is but one portage of 50 miles. *Lake Athabasca* receives nearly all its waters from the *Athabasca River*; and its principal feeder traverses not its length but its breadth, and that not in its middle, but at its extremity. The lake's sole outlet is the river *Athabasca*. It is about 230 miles long, and from 14 to 30 broad. It was discovered in 1771 by Samuel Hearne, and named by him *Lake of the Hills*. Trading stations were soon afterwards established on its shores. A silting-up process has been going on, from its numerous water-courses. —*ATHABASCA* is the name of one of the four divisions of the Canadian North-west, defined in 1882, between British Columbia and a line to the east of the *Athabasca River*, and between the parallels 55° and 60° N. lat. It contains the fertile *Peace River* districts, and has an area of 122,000 sq. m. Estimated population, 10,000.

Athali'ah, the daughter of Ahab, king of Israel, married Jehoram, king of Judah, and introduced into the southern kingdom the worship of Baal. After the death of her son Ahaziah, who succeeded him, but reigned for only one year, she sought to pave her own way to the throne by putting to death all the seed-royal. Ahaziah's son Joash was, however, hidden by his aunt, and after Athaliah had reigned six years, the high-priest Jehoiada placed Joash on the throne (878 B.C.), and caused her to be put to death. This narrative (2 Kings, xi. ; 2 Chronicles, xxii. xxiii.) is the subject of an oratorio by Handel, and of Racine's drama, *Athalie*, for which Mendelssohn composed the music.

Athanas'aric, a prince of the Western Goths, whose settlements lay on the north bank of the Lower Danube, in the 4th century. He fought three successive campaigns with the Emperor Valens, but was finally defeated in 369. When the Huns advanced towards Europe, Athanasaric attempted to secure the eastern borders of his kingdom; but the Huns defeated the Goths, and advanced in great force into the plains of Dacia. When, in 376, the Western Goths had settlements granted them by the Romans on the south of the Danube, Athanasaric, with a part of his people, refused to accompany them, and removed to the west. In 380, however, he was obliged to retire, when he accepted the hospitality of the empire at the hands of Theodosius. At this time died Fritigern, king of the Goths, who had settled on the south of the Danube; and Athanasaric, being made king of the whole Western Gothic nation, concluded a treaty incorporating that people with the other subjects of the empire. He died at Constantinople in 381.

Athanasian Creed, the third of the three œcumenical symbols, derived its name from its composition being attributed to Athanasius; it is also known, from its initial words in Latin, as the creed or psalm *Quicumque Vult*. The first part of this creed contains a detailed exposition of the Trinity; the second, the doctrine of the incarnation. Modern criticism has called in question the title of Athanasius to be considered the author of this creed. It was known as early as the beginning of the 6th century, but not under its present name. It is spoken of as 'Athanasius's Tract on the Trinity,' in some Articles of the middle of the 8th century, and is supposed to be alluded to 'as the 'rith of the holy prelate Athanasius,' in the Council of Autun, about 670. Athanasius himself makes no mention of this creed, although its doctrines are essentially his; nor do any of the church fathers. Other two circumstances speak against its ascription to Athanasius: the best text is in Latin, and he wrote in Greek; the expressions, again, are

different from those used by Athanasius in speaking of the same things. By Protestants, therefore, and even by most Catholics, its Athanasian origin has been given up, and its production has been assigned with most probability to the 5th century and to Gaul. The title of Athanasian probably became attached to it during the Arian controversy in Gaul, as being an exposition of the system of doctrine which was opposed to the Arian system, and which would naturally be called Athanasian from its chief propounder. It was received into the public offices of the Gallic Church in the 7th century, and by the middle of the 10th century it was adopted at Rome and all over the West. In Britain, it was probably in use as early as 800. The Greek Church was late in receiving it, and even then not without modifying the article concerning the 'Procession of the Holy Ghost.' The Reformers adhered to the Athanasian Creed, and Luther called it 'a bulwark of the Apostles' Creed,' and doubted whether, 'since the time of the Apostles, any more important and more glorious composition had been written.' Even those churches that do not in any way acknowledge it as a symbol (as the Presbyterian Churches of Britain and America, as well as the Independents) generally accept its doctrines.

The Athanasian Creed is the most rigid of the three Catholic symbols, and has given rise to much controversy; and though still generally received by Protestants as well as Catholics, attacks upon it have, of late years, perhaps been more frequent. It has no place in the Prayer-book of the Protestant Episcopal Church of America; and the Protestant Church of Ireland, though retaining it in the Prayer-book, has ceased to recite it. Nevertheless, these attacks have called forth energetic defences; and at the Convocation of Canterbury in 1871, the testimony of the missionary bishops was given in support of the great value of this creed in the instruction of the heathen. The points in this creed that give offence to some are defended by others, on the plea that it was not drawn up for the sake of gratuitously dogmatizing on abstruse speculative truths, but to counteract other dogmas which were held to be dangerously heretical. Waterland says: 'The use of it will hardly be thought superfluous so long as there are any Arians, Photinians, Sabellians, Macedonians, Apollinarians, Nestorians, or Eutychians, in these parts.' With respect to what are called the 'damatory clauses' (the clauses, namely: 'Which faith except every one do keep whole and undefiled, without doubt he shall perish everlastingly;' and: 'This is the Catholic faith, which except a man believe faithfully, he cannot be saved'), the churches which adopt the creed do not mean by them to imprecate curses, but to declare, as a logical sequence of a true faith being necessary to salvation, that those who consciously and deliberately reject the true faith are in danger of perishing; as it is said, Mark, xvi. 16, 'He that believeth not shall be damned' ('condemned' in Revised Version). These clauses are also held to apply to those who deny the substance of the Christian religion, and not infallibly to every person who may be in error as to any one particular article. A rubric to this effect was drawn up by the commissioners appointed in 1689 for the review of the English Common Prayer-book, but none of their suggestions took effect. Compare also the 18th Article of the Church of England with these clauses.

On the date of the creed much curious learning has been bestowed of late years, Professors Lumby and Swainson of Cambridge arguing for a later date between 700-800 A.D., and the Rev. W. Foulkes regarding it as a forgery. But a strong

and probably triumphant case for the earlier date (of about 450 A.D.) has been made by the Rev. G. W. Ommaney, M.A., in *The Athanasian Creed* (Lond. 1875), and a subsequent volume. The work of Waterland, *A Critical History, &c.* (Cambridge, 1724), must, however, still remain in the first rank of inquiries of this nature; and though he may not have proved St Hilary of Arles to be the author, it is now generally accepted as a Latin composition, and due to Southern Gaul, most probably about 450 A.D. For explanation of the meaning of the damnable clauses, the best recent works are a volume on the subject by Canon Malcolm MacColl (Lond. 1872), and a sermon by Dr Pusey on *Responsibility of the Intellect in Matters of Faith* (Lond. 1873).

Athanasius, Primate of Egypt, was born in Alexandria about the year 296 A.D. There are no particulars on record of his lineage or his parents. Alexander, then officiating as primate or patriarch of Alexandria, brought him up in his own family, and superintended his education, with the view of his entering on the Christian ministry. In his youth, he often visited the celebrated hermit St Antony, and embraced for a time the ascetic life with the venerable recluse. He was only a deacon when appointed a member of the first general council at Nice (325), in which he distinguished himself by his erudition and his eloquence.

His patron, Alexander, having died in the following year, he was duly elected to the primacy by the clergy and people; and was but newly installed in his office, when Arius, who had been banished at the time of the condemnation of his doctrine at Nice, was recalled, and made a recantation of his erroneous principles. Athanasius, it is said, refused on this occasion to comply with the will of the emperor that the heretic should be restored to communion. On this account, and in consequence of several other charges brought against him by the Arian party, he was summoned by the Emperor Constantine to appear before the synod of Tyre, in 335 A.D., which deposed him from his office. The sentence was confirmed by the synod of Jerusalem in the following year, when he was banished to Augusta Trevirorum (Treves). In 338, however, he was recalled from his banishment, and restored to the primacy at Alexandria. His entrance into the city was like a triumphal procession; but the Arians soon rose against him, and (in 341) he was again condemned by a council of ninety-seven (mainly Arian) bishops, assembled at Antioch. Against this decision a protest was made by a hundred orthodox bishops at Alexandria; and in a council held at Sardica, 300 bishops, countenanced by Julius, Bishop of Rome, confirmed the decision in favour of Athanasius, who was again replaced in his office (349). The Arians once more acquired the ascendancy after Constantius (in 353) had been made emperor of both the East and the West; for in that year Athanasius was condemned by a council held at Arles, and the sentence was confirmed by another held at Milan in 355, the influence of the sovereign being strongly exerted to secure his condemnation. As the resolute patriarch had declared that he would not leave his place without an express order from the emperor, violent means were resorted to for his expulsion. While engaged in conducting divine service, he was interrupted by a company of soldiers, from whom he made his escape into the Egyptian desert. A price was set on his head; and to avoid his persecutors, he retired from the usual haunts of the anchorites to a remote desert in Upper Egypt, where he was attended by but one faithful follower. Here he wrote several works to confirm orthodox Christians

in their faith. On the accession of Julian to the imperial throne, toleration was proclaimed to all religions, and Athanasius returned to his former position as Patriarch of Alexandria (361). His next controversy was with the heathen subjects of Julian, to whom the patriarch, by his zeal in opposing their religion, had made himself very offensive. To save his life, he was compelled again to flee from Alexandria, and remained concealed in the Theban desert until 363, when Jovian ascended the throne. After holding office again as patriarch for only a short space of time, he was expelled anew by the Arians, under the Emperor Valens. Athanasius now found refuge in the tomb of his father, where he remained hidden four months, until Valens, moved by petitions from the orthodox Alexandrians, restored the patriarch to his see, in which he continued till his death in 373 A.D.

Athanasius was the leading ecclesiastic during the most trying period in the history of the early Christian Church. His ability, his conscientiousness, his judiciousness and wisdom, his fearlessness in the storms of opposition, his activity and patience, all mark him out as a conspicuous ornament of his age. Though twenty years of his life were spent either in exile, or what was equivalent to it, yet his prudence and steadfastness, combined with the support of a large party, crowned his exertions with complete success. He was a clear thinker, and as a speaker, was distinguished for extemporaneous precision, force, and persuasiveness.

His writings are polemical, historical, and moral; all marked by a style simple, cogent, and clear. The polemical works treat chiefly of the doctrines of the Trinity, the incarnation of Christ, and the divinity of the Holy Spirit.

The earliest edition of the collected works of Athanasius in the original Greek appeared in two volumes, folio, at Heidelberg in 1600. Better is the great edition by Montfaucon (1698); and the standard edition in four volumes of the Abbé Migne's great *Patrologia Græco-Latina* (1860). Athanasius' Four Orations against the Arians, and his Oration against the Gentiles, were translated by Parker (1713); his Treatise on the Incarnation of the Word, by Whiston (1713; another edition, 1880). The Epistles of Athanasius in defence of the Nicene Creed, and on the Councils of Ariminum and Seleucia, together with his first Oration against the Arians, were translated, with notes, by Cardinal Newman (1842). See the church histories by Neander and others; also works on Athanasius by Möhler (2d ed. 1844) and Böhlinger (2d ed. 1874); and Bright's edition of the Orations against the Arians. Hooker gives an eloquent and fervid eulogy of Athanasius in his *Ecclesiastical Polity* (book v.). The Duc de Broglie's narrative, in his *L'Eglise et l'Empire au IV^{ème} Siècle*, tomes i. ii. (Paris, 1856), is excellent. Canon Bright's article 'Athanasius,' in Smith's *Dictionary of Ecclesiastical Biography*, is most accurate and exhaustive. But it is singular (as Cardinal Newman has observed) that hardly any professed ecclesiastical historian has given a more lively impression of the greatness of Athanasius than the sceptical Gibbon in his *Decline and Fall of the Roman Empire*, vols. iii. and iv. See the article **ARIUS**.

Atheism is the doctrine that there is no God. The word, which first appears in English literature in the latter part of the 16th century, is derived from Gr. negative prefix *a*, and *Theos*, 'God.' The name atheist is said to have been first applied in Greek literature to one of the followers of the materialistic philosopher Democritus (q.v.). It has been doubted by Addison, Bacon, and Dr

Arnold, whether a real atheist ever existed; indeed, Addison would not have hesitated to say to any man who professed atheism that he was an impudent liar, and that he knew it. But, notwithstanding, it seems unquestionable that there have been, and that there still are such. The ancient Greeks, who detested atheism so cordially that they banished its abettors and branded their names in history, have handed down to us, with this stigma attached to them, the names of Diagoras, of Bion, and of Lucian—men who did not believe in the gods. In recent and modern times such men as La Mettrie, Von Holbach, Feuerbach, and Gustave Flourens, to name no others—have advocated this doctrine in the most explicit manner; and when, for example, Feuerbach says: 'It is clear as the sun, and as evident as the day, that there is no God'; or, when Flourens wrote these words: 'Our enemy is God' . . . 'Hatred of God is the beginning of wisdom' . . . 'If mankind would make true progress, it must be on the basis of atheism,' there seems no reason to doubt that their language may be regarded as expressing their real sentiments.

There are three forms of argument employed in the advocacy of atheism—viz. the *dogmatic*, which positively asserts that there is no God; the *scptical*, which maintains that the finite mind of man is incapable of ascertaining whether there is a Divine Being or not; and the *critical*, which holds that the evidences adduced in support of Theism (q.v.) are inadequate. The first of these—the dogmatic—has now fallen largely into disrepute. In Britain, this is largely owing to the trenchant reasoning of John Foster, and subsequently of Dr Chalmers. These writers set themselves to show that dogmatic atheism is a palpable absurdity. Before any man is entitled to assert that there is no evidence of the existence of God, he must, they argue, explore all parts of the universe; for evidence that would convince even *him* may be extant somewhere. To prove a negative is proverbially difficult; but to prove *this* one, nothing short of omniscience and omnipresence would be requisite. Modern non-believers in the existence of God cautiously restrict themselves to the sceptical and the critical methods, and, instead of positively asserting that there is no God, they come in favour of Agnosticism (q.v.). The relation of atheists to oaths in courts and in parliament is discussed at OATHS. See also the articles GOD, APOLOGETICS.

Atheling (Old Eng. *Æthel*, 'noble'), a title of honour among the Anglo-Saxons, which, at first applied to the descendants of the primitive nobles of the first settlement, gradually became confined to the princes of the blood royal, and, in the 9th and 10th centuries, exclusively to the sons and brothers of the reigning king.

Athelney, ISLE OF, a marsh at the junction of the rivers Tone and Parret, in the middle of Somersetshire, about 7 miles from Taunton. Here Alfred hid himself for nearly a year when driven from his throne by the Danes in 878, and here he founded, in 888, a Benedictine abbey, now entirely gone. Among the many relics found in this spot is a ring of Alfred's, preserved in the Oxford Museum. The name Athelney means 'island of the nobles,' or 'royal island.'

Athelstan, son of King Edward the Elder, and grandson of Alfred the Great, was born about 895 A.D., and was crowned king of the Mercians and West Saxons at Kingston-upon-Thames in 925. He conquered portions of Cornwall and Wales, and, on the death of Sihtric, king of Northumbria, who had married one of his daughters, made his successor tributary. In 937,

a league, composed of Welsh, Scots, and Danes, was formed against him; and a fierce and decisive battle was fought at Brunanburh (q.v.), in which the allies were utterly defeated, and which became famous in old English song. After this, the reputation of Athelstan, now practically king of all England, spread into the Continent; one of his sisters married Otto the Great, afterwards emperor; another, Hugh, Duke of the French, father of Hugh Capet. At home he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and promoted commerce. He died in 941.

Athena, or PALLAS ATHENA, one of the greater Greek divinities, forming, with Zeus and Apollo, the supreme triad in Greek mythology. Of her origin and parentage different accounts are given, probably from the confusion of various local legends; but the best-known version of the myth represented her as the daughter of Zeus and Metis. Zeus, we are told, when he had attained supreme power after his victory over the Titans, chose for his first wife Metis ('wisdom'); but being advised by both Uranus ('heaven') and Gaia ('earth'), he swallowed her when she was pregnant with Athena. When the time came that Athena should have been born, Zeus felt great pain in his head, and caused Hephaestus (Vulcan) to split it with an axe, whereupon the goddess sprang forth—fully armed, according to the later stories. Under the gross accretions which conceal the significance of the myth, we may see in this account of Athena's parentage an effort to set forth a divine symbol of the combination of power and wisdom. Her father was the greatest, her mother the wisest of the gods. She is literally born of both, and so their qualities harmoniously blend in her. She is the personified reason, the wisdom of the divine father; while Apollo, no less beloved of Zeus, is his mouth, the revealer of his counsel. She is a maiden goddess, everlastingly young and fair. Though her heart is inaccessible to the passion of love, she is not a cold unfeeling divinity, but interests herself warmly in the affairs of both gods and men. She is the patroness of agriculture, the inventor of the plough and rake, the first to introduce the olive into Attica, and (in harmony with her character as the personification of active wisdom) to teach men the use of almost all the implements of industry and art; and she is said to have devised nearly all feminine employments. Philosophy, poetry, and oratory are also under her care. She is the especial patroness of the Athenian state, protects its liberties by her power and wisdom, maintains the authority of law and justice in her courts, and was believed to have instituted the court of justice on Mars' Hill (the Areopagus). The industries of its citizens are dear to her—she is the 'workmistress' (*Ergane*), the goddess of all useful and elegant arts. As a warlike divinity, she approves of those wars only which are undertaken for the public good, and conducted with prudence; and thus she is regarded as the protectress in battle of those heroes who are distinguished as well for their wisdom as their valour. In the Trojan wars she favoured the Greeks, and in the war of Zeus against the giants she assisted her father with her counsel, killed the giant Pallas, and buried Enceladus under the island of Sicily. Her worship was universal in Greece, and representations of her in statues, busts, coins, reliefs, and vase-paintings are numerous. She is always dressed, generally in a Spartan tunic, with a cloak over it, and wears a helmet adorned with figures of different animals; her aegis, the round Argolic shield, has in its centre the head of Medusa. Her countenance is beautiful, earnest, and thoughtful, and the whole figure

majestic. One of the two masterpieces of Phidias was his great statue of the virgin Athena, on the Parthenon at Athens. In it were combined chastity with gentleness, victorious strength with calm peace, profound wisdom with perfect simplicity. It was not only a production of the highest art, but at the same time the expression of a profound religious idea. From Greece her worship was carried to greater Greece, and many temples were erected in her honour. In Italy proper she was identified with Minerva, a native goddess of wisdom, and worshipped with Jupiter and Juno.

Athenæum (Gr. *Athēnaion*), originally a Temple of Athena (Lat. *Minerva*), afterwards a kind of college or institution for higher education. The first at Rome was that founded by the Emperor Hadrian about 133, for the study of poetry and rhetoric, with a regular staff of professors. It existed as the *Schola Romana* until the 5th century. Similar institutions flourished in the provinces also, as at Lyons and Nîmes. Theodosius II. founded one at Constantinople for the eastern world. In modern times the name has been revived as an appellation for certain literary institutions, as that at Marseilles, and also as a collective title for literary essays and reviews. The weekly journal of literature, science, and art, published in London under this name, is well known. It commenced in 1827.

Athenæus, a Greek writer, born at Naucratis in Egypt. He lived first at Alexandria and afterwards at Rome about the close of the 2d and beginning of the 3d century. His work, entitled *Deipnosophistæ* ('Banquet of the Learned'), in fifteen books, but of which we possess only the first two, and parts of the third, eleventh, and fifteenth, in an abridged form, is very interesting as one of the earliest collections of *Ana*. It consists of extracts from more than 1500 books, put in the form of table-talk at an imaginary banquet, at which Galen the physician and Ulpian the jurist are among the guests. Every possible subject is introduced and illustrated by fragments from the poets, dramatists, and philosophers; but of the learned author's thousand and one interests, gastronomy seems to have been the dearest. But he loved 'titbits' of scandal no less than of cookery, for he tells many stories to the discredit of people whom history praises, which of course we are not by any means bound to believe. His dialogue is prolix and lumbering; and his work is not irradiated by a single gleam of genius, and has only achieved immortality through being a storehouse of miscellaneous information that otherwise would have been lost. The best editions are by Schweighäuser (14 vols. 1801-7), Dindorf (3 vols. 1827), Meineke (4 vols. 1853-67). There is an English translation of Athenæus (3 vols. 1854).

Athenagoras, an early Christian philosopher, who taught first at Athens, and afterwards at Alexandria. He is the most elegant writer among the so-called apologists in the second half of the 2d century, and we possess two writings from his pen—his *Legatio pro Christianis*, addressed to the Emperor Marcus Aurelius and his son Commodus, composed about 163, and *De Resurrectione Mortuorum*, written about 180. In these he defends the Christians against the heathen charges of atheism, incest, and cannibalism with great clearness and convincing power.

Athenais, an Athenian lady of distinguished beauty and learning, who in 421 A.D. became the wife of the Emperor Theodosius II., and assumed the name of Eudocia (q.v.).

Athens, the capital of Attica, the metropolis of ancient Greek culture, takes its name, probably, from Athena (q.v.), 'goddess of science, arts, and arms,' who from earliest times was the patron divinity of the city. Cecropia, from the mythical king and hero Cecrops, the city was also called in ancient times.

Athens owes its original location, doubtless, to the craggy rock known as the Acropolis (q.v.), that rises more than 500 feet high above the Attic plain, and that in earliest days served for citadel as well as for residence and site of sanctuaries. With the growth of the population, the parts below and adjacent to the Acropolis, especially on the western and southern slopes, became inhabited.

Prior, however, to this earliest period in the history of Athens as a Greek city, it is held by many that there was a settlement of Phœnicians on the slopes of the hills towards the sea, numerous remains of which, in the form of cellars, cisterns, graves, steps, seats, all cut into the native rock, are still to be seen, constituting what is generally known as 'The Rock City.' That the Phœnicians visited these coasts for commerce in the 13th century before our era, that they were the teachers of the Greeks in various arts, and that they introduced into Attica the cultivation of the olive-tree, so well suited to the dry and chalky soil of this land, are generally accepted facts.

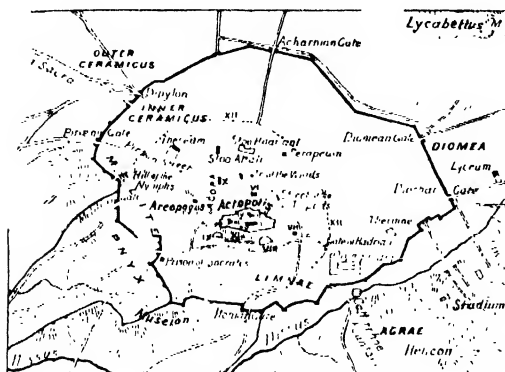
To understand the subsequent history and growth of Athens, it is necessary first to take into view the natural advantages of its position. Few cities, if any, can boast a more beautiful situation.

The Attic plain, which immediately surrounds the city on the east, north, and west, is bounded by the range of Hymettus (3368 feet), famous for its purple tints, on the east; by Pentelions (3641 feet), noted for its quarries of marble, rich even to-day, on the north-east; by the range of Parnes (4634 feet), well wooded at the base, but barren at the summit, on the north; by the lower and nearer range of Corydallos (1535 feet), extending to the bay of Salamis, on the north-west; and on the west and south by the Saronic Gulf, in whose waters lie, in plain sight, the islands of Salamis and Egina. The site of the city is itself diversified by several hills which add greatly to the beauty of the scenery.

Standing upon the Acropolis one sees to the east Mount Lycabettus, a conical-shaped mount 911 feet high, on whose summit Zeus once had a sanctuary where now stands a small chapel dedicated to St George, the patron saint of the modern Greeks. To the south-west rises the hill of the Muses, or the Mouseion, surmounted now by the ruins of a monument to Philopappus, who was Roman consul about 100 B.C. In the side of the Mouseion are three rocky chambers, doubtless ancient sepulchres, but popularly known as the 'Prison of Socrates,' according to a tradition that goes no farther back than the middle ages. Immediately adjacent to this is a lower eminence called the hill of the Pnyx, from the fact that on its slope tradition locates the place of popular assembly. At the upper end of the terrace, which is supported below by a wall of polygonal masonry, stands a cube of rock surrounded at the base by steps. This has long been supposed to be the ancient *bema* or tribune of the assembly—an opinion not held by many recent scholars, who take it to be a great rock altar, probably dedicated to the worship of the 'Highest Zeus,' to whom many votive tablets have been found in the neighbourhood.

Just below the western foot of the Acropolis lies the rocky hill called the Areopagus or hill of Ares (Mars), so named from the myth according to which Ares was tried for the murder of Hallirotios before the twelve gods of Olympus, who held court on this

eminence. It was here that the most venerable court of Athens had its sittings to try cases of wilful murder, to exercise judicial censorship over the life of the citizens, and to guard the sanctity of



Plan of Ancient Athens :

- | | |
|---|--------------|
| I. Parthenon, | } Acropolis. |
| II. Erechtheion, | |
| III. Propylæa, | |
| IV. Temple of Athena Promachus, | |
| V. Temple of Athena Ergane, | |
| VI. Prytaneum, | |
| VII. Choragic Monument of Lysistrates, | |
| VIII. Theatre of Dionysus, | |
| IX. Odeum of Herod, | |
| X. Stoa Poecile, | |
| XI. Sanctuary of Esculapius, | |
| XII. Circuit of the walls before the Persian war, | |

ancient law and tradition, particularly such as pertained to religion. Before this court, or at least on this hill, the apostle Paul delivered his well-known vindication of the Christian faith recorded in Acts, xvii. Just beyond the Areopagus, with a narrow valley between, lies the Hill of the Nymphs, once occupied by sanctuaries and dwellings, and now the site of the astronomical observatory. The view beyond includes the harbours of Phalerum, Munychia, Zea, and the Piræus (q.v.). The superior position and greater extent of the last-named harbour have made it, ever since the days of Themistocles, the seaport of Athens. To the south and east of the city flows the Ilissus, and to the north and west the less celebrated but more copious Cephissus. In the summer both streams are nearly dry, and at no time are they large enough to deserve the name of rivers. They are of great value, however, in the winter and spring for irrigating the vineyards and olive-groves that cover the plain. The most famous spot in the plain is the grove of the hero Academus, situated about a mile north-west of the city, where the 'divine Plato' taught his philosophy and founded his school, which has become famous under the name of the *Academy* (q.v.). Adjoining this grove is a knoll called *Colonus*, in the ancient *dēmos* of that name, famous as the birthplace of the tragic poet Sophocles, who celebrates the beauty of this region in one of the finest of the odes in his tragedy of *Edipus at Colonus*. On this hillock are the tombs of two of the most distinguished of modern archaeologists, Ottfried Müller and Charles Lenormant.

That a city so beautifully situated, enjoying a delightful climate the greater part of the year, under a sky wonderful for its clearness (as Euripides says of the Athenians of old, 'marching through an ether of surpassing brightness'), inhabited by a race so gifted as were the ancient Ionian Greeks, should play an important rôle in history, is not at all surprising. The history of the city may be most conveniently narrated by dividing it into four epochs: (1) The period from the time of Cecrops

to the battle of Plataea, 479 B.C. (2) The most flourishing period of Athens, extending to the close of the Peloponnesian war, 403 B.C. (3) The decline of Athens, embracing the Alexandrian, Roman, Byzantine, Frankish, and Ottoman periods. (4) Modern Athens.

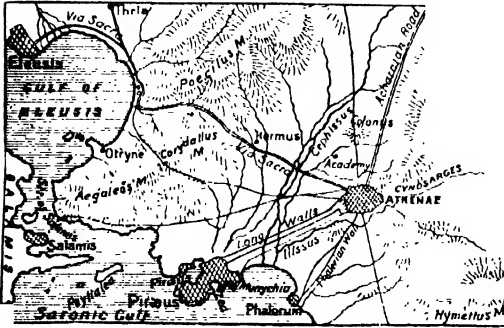
(1) The oldest history of Athens as a city is connected with the reforms of Theseus and Solon. Theseus was a mythical hero to whom, as his name may indicate, was attributed the credit of organising the scattered population of Attica into communities and of instituting several of the most important Athenian festivals. At this time the Acropolis was the abode of the king and the priests, and was the site of the Prytaneum or town-hall, as well as of the sanctuaries and altars of Athena, Erechtheus, Zeus, and Poseidon.

In the 6th century B.C., under the reforms of Solon and the fostering hand of the tyrant Pisistratus, Athens fairly began her prosperous career. Amid much that is mythical in the history of the reforms of Solon, it is certain that he gave a new place to the *dēmos* as the unit and centre of political life, and to the *ecclesia* or popular assembly, before which all acts of government were to be brought for discussion and approval. By him also the populace was divided for political purposes on a property basis into four classes, of which the first three were eligible to office. At this time the chief rule was already lodged in the hands of nine archons who were chosen annually. To the family of Pisistratus Athens owes the earliest structures that were at all beautiful or imposing. On the Acropolis Pisistratus erected a temple in honour of Athena, which was destroyed by the Persians, and some architectural remains of which are still seen built into the northern wall of the Acropolis. There are some who believe that the foundations of a large temple, recently exhumed between the Parthenon and the Erechtheion, are the ruins of this Pisistratean structure. Still more imposing was the temple begun by Pisistratus on the bank of the Ilissus in honour of Olympian Zeus, and ever since known as the Olympieum. Within a peribolus of four stadia a structure was reared whose dimensions afterward became 354 feet in length, 171 in breadth, and which when completed was adorned with 120 columns of Pentelic marble, 60 feet in height and 6 feet in diameter. The ruins of this colossal temple, consisting of 16 columns, most of which have an architrave, form one of the most impressive sights of Athens.

The reforms of Cleisthenes in 506 B.C. gave the government of Athens a still more democratic form by making all citizens eligible to office, by enlarging the authority of the popular assembly, and by creating popular courts of justice. Doubtless these reforms stimulated the erection of new buildings for the use of the state, many of which were located about the ancient Agora, whose exact situation has been a matter of much dispute until this very day. The conflict with Persia which originated in the Ionic revolt and the destruction of Sardis in 499 B.C., indirectly led to the naval supremacy of Athens, under the wise guidance of Themistocles. In 480 B.C. the Athenians abandoned their city to the ruthless vengeance of the Persian invaders, who burnt and destroyed all its houses and temples.

(2) After the victories of Salamis and Plataea, the Athenians splendidly rebuilt their city, which now entered upon the most brilliant epoch of its career. Under the leadership of Themistocles, Cimon, and Pericles, Athens reached the zenith of her power, and became fortified by numerous walls and bulwarks, and beautified by the erection of splendid temples. To this period belong the walls around the Acropolis, and the city walls with their ninety-seven towers and ten gates, measuring a

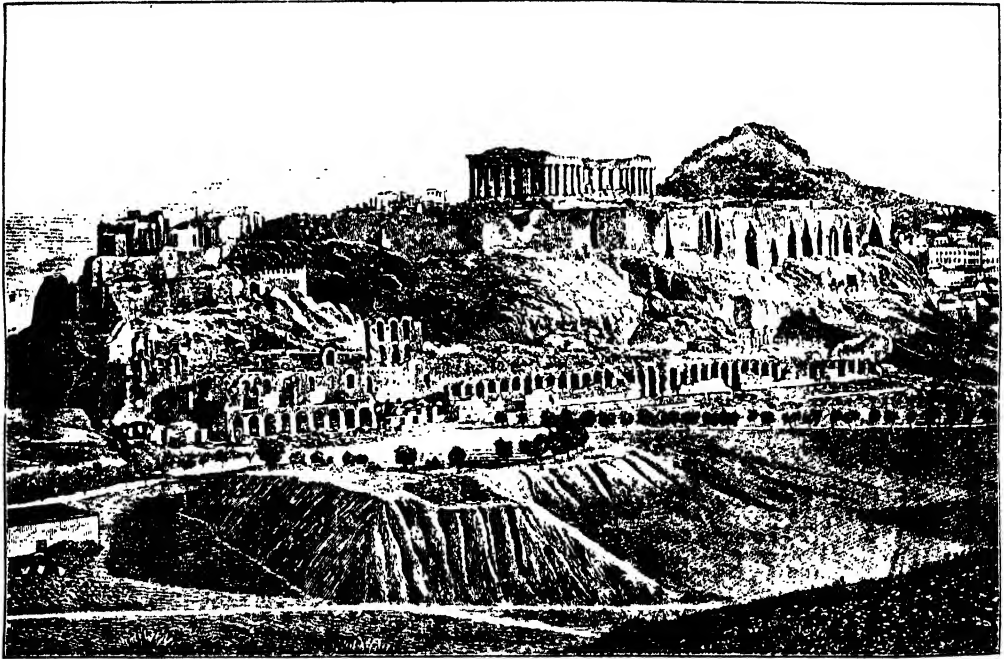
circumference of forty-three stadia, or almost five miles. The chief gate was at the north-west, and led to the Academy. It was called the Dipylon or double gate, and its form may still be seen from



Map of the Country round Ancient Athens.

the foundations which have recently been brought to view by excavation. Just outside of this gate was the Cerameicus ('Potter's field') or ancient cemetery, where one sees to-day some of the most

beautiful sepulchral reliefs known to art. For the better defence of the city and of its harbour, Piræus, the famous 'long walls' were built by Pericles. Together with the fortifications of the Piræus, which had previously been built by Themistocles, they formed a complete fortress, sometimes denominated, on account of its length, which was about five miles, the 'Long Fortress.' The inclosure between the two parallel walls was for the larger part of the way about 550 feet wide, and formed a continuous broad street between the city and its port. Traces of these walls are still to be seen. The age of Pericles in Athenian history corresponds to the Elizabethan period in the history of England. Among the great names of this illustrious period may be mentioned Mnesicles and Ictinus in architecture, Phidias and Myron in sculpture, Æschylus and Sophocles in tragedy, Socrates and Plato in philosophy, Herodotus and Thucydides as historians, and Pindar and Simonides as lyricists. Of the monuments of architecture and sculpture belonging to this period the most important are the Parthenon (q.v.), the Erechtheum, the Temple of Wingless Victory (*Nike Apteros*), the Propylæa, the Theseum, the Choragic Monument of Lysicrates, and the statues and reliefs that adorned these structures. It is



View of the Acropolis of Athens from the Mousæion Hill, showing the ruins of the Parthenon and the Propylæa.

The arches belong to the ruins of the Odæon of Herodes Atticus, and other buildings of the Roman period. The hill to the right is the Mousæion.

from the contemplation of these ruins and remains that the beholder gains such a conception of the purity and exquisite grace of ancient art as he can get nowhere else. The simplest and most majestic structure of all is the Parthenon, built in the Doric style, and richly ornamented with polychromatic colouring. Its cella contained the chryselephantine statue of the virgin goddess from the hand of Phidias. Its pediments were adorned with groups of statuary representing the birth of Athena, and the contest of Poseidon and Athena for the possession of Attica. The frieze around its cella wall portrayed the procession of the Panathenæic festival. Of these sculptures the

largest part of what has been preserved was carried by Lord Elgin to the British Museum, where the collection is known as 'the Elgin Marbles' (q.v.). The temple first became a ruin in 1687, through the bombardment of the Venetians, one of whose lieutenants had the wretched good luck to send a bomb into the powder stored by the Turks in the cella. Shattered and battered though it is, the Parthenon is perhaps the most beautiful ruin in the world. Of the Erechtheum, which was built in the Ionic style, and which has a form entirely different from that of any other known temple, the most beautiful part, the so-called 'Porch of the Caryatides,' is still in fair state

of preservation, and shows six graceful female figures supporting the architrave. The Propylæa, which formed the entrance to the Acropolis, consisted of three parts—viz. a central porch with five gates, and a north and south wing. It was the most massive secular structure of ancient Athens, but, probably through the distractions and expenditures of the Peloponnesian war, was never completed. Contiguous and in front of the south wing of the Propylæa is the Temple of Wingless Victory, built in the Ionic style and of Pentelic marble. On a slight elevation north-west of the Acropolis stands the so-called Theseum, the best preserved of all the structures of the ancient city. It was built somewhat earlier than the Parthenon, is also of the Doric order, and derives its name from the tradition that here the remains of Theseus were brought from the island of Scyros and interred. Most modern scholars believe it was a temple of Heracles or of Hephaestus. In the middle ages it served as a Christian church dedicated to St George. The gold brown tint of the weather-stained Pentelic marble presents, in the glow of the rising or setting sun, a peculiarly beautiful effect.

In an out-of-the-way corner, south-east from the Acropolis, amid squalid surroundings, stands the graceful Choragic Monument of Lysicrates. This monument owes its origin to the custom of dedicating the tripods given in the Dionysiac contests to the victorious chorons. It is in the form of a small circular temple, which served as the base of the tripod, and is one of the earliest specimens of the Corinthian architecture. On the south slope of the Acropolis was the sanctuary of Dionysus, where later was built the great theatre, the remains of which, consisting of seats hewn into the rock, marble thrones, pieces of a later proscenium, and other architectural fragments, still testify to the interest of the Athenians in the festivals of the god of the vine. Closely adjacent, on a higher terrace, lay the sanctuaries of Esculapius, Themis, Aphrodite, and Demeter, of which little except the foundations remain.

(3) In its most flourishing period, Athens contained upwards of 10,000 dwellings, and numbered at least 100,000 free inhabitants, and more than twice as many slaves. The number of citizens who were entitled to vote and to hold office was about 20,000. The decline of Athenian power and prosperity dates from the close of the Peloponnesian war (403 B.C.), which had exhausted the resources of Athens and broken her spirit. Still, at this time there were not wanting patriots and statesmen, such as Demosthenes and Lycurgus, who secured for Athens a new though brief ascendancy among the states of Greece, and made her the bulwark of Hellenic independence, until the fatal battle of Cheronea (338 B.C.), which established the Macedonian supremacy. Lycurgus, who stood for many years at the head of the financial administration of Athens, was most active in fortifying and building up the city. A new and magnificent arsenal in the Piræus, called after its architect the arsenal of Philon, was erected under his direction, and in Athens he built a new stage structure and lined the seats of the Dionysiac theatre with marble. On the banks of the Ilissus he laid out the Stadium, used for the first time in 330 B.C. for the games of the Panathænaic festival; it had seats for no less than 45,000 persons. He enlarged and beautified the gymnasium known as the Lyceum, where Aristotle expounded his science and philosophy. During the subsequent Macedonian occupation, Demetrius of Phalerum gave the city a wise administration. Now Athens became the seat of schools of philosophy and

rhetoric, and the metropolis of polite learning. The long list of benefactors of Athens during the Alexandrian period begins with Ptolemy Philadelphus (284 B.C.), who founded a gymnasium and library which bears his name. The kings of Pergamus, Attalus and Eumenes, built markets and halls and theatres, and the Syrian Antiochus Epiphanes (175 B.C.) resumed the building of the Olympieum, which for a long time had remained half completed. With the destruction of Corinth in 146 B.C. by the Romans, and the dissolution of the Achaean League (q.v.), Athens with the rest of Greece became a Roman province. Yet for a long time the conqueror Rome sat at the feet of the conquered Athens, to learn her art and letters, and to gain from her sages teachings of philosophy and rules of statesmanship. Of the buildings of this period should be named especially the Tower of the Winds, which served as a kind of public clock and barometer, built by Andronicus Cyrrhestes, and the Gate of the Agora. The Emperor Hadrian, probably no less through a desire to gratify his vanity than from a love of Greek culture, gave Athens a fresh revival of art and a new prosperity. An entire quarter of the city, south-east of the Acropolis, was named after him, as is attested by an inscription which can still be read on the 'Gate of Hadrian.' He finished the great Temple of Zeus begun by Pisistratus, which was thus more than 600 years in course of building. About the same time a wealthy Athenian, Hierodes Atticus of Marathon, built, in honour of his wife Regilla, a magnificent theatre or odeum, the ruins of which rise conspicuously above all other remains of the ancient city at the foot of the Acropolis. But here is the turning-point. From this time onwards the history of Athens is only one of spoliation and destruction, first by Romans, then by Goths, then by Christians, and last by Mussulmans. The Athenians had to pay dearly for espousing the cause of King Mithridates against the Romans. After a long siege, the Romans under Sulla took Athens and plundered it of many works of art. In 267 A.D. the city was captured by the Goths. In the next century Constantinople began to draw works of art from Athens for her adornment. The schools of philosophy, especially the Neoplatonic, still maintained their existence, and were the support of pagan religion. At last the Emperor Justinian, in 529 A.D., closed by edict the Athenian schools of philosophy, and the light of science and learning that had been shining for so many centuries, though but dimly at the last, was now wholly extinguished. The temples were converted into churches, whereby they suffered many architectural changes. In 1019 the Emperor Basilus II. held in the Parthenon, now called Panagia, or the church of the Madonna, a religious celebration in gratitude for his victory over the northern barbarians. In 1204, after the conquest of Constantinople, Boniface de Montferrat became king of Greece. Athens was ruled by a succession of Frankish dukes until 1456, when the city fell into the hands of the Turks, under whose blighting despotism, with a brief interruption of Venetian ascendancy, it remained until the deliverance of Greece was effected in 1833 through the intervention of the great powers of Europe.

(4) With the liberation of Greece from the yoke of Turkey begins the history of Modern Athens. Before the transfer of the capital from Nauplia by King Otho, who had been chosen to the throne of the new kingdom, Athens was a wretched village of a few hundred houses. Since that time it has enjoyed a prosperous growth. Modern Athens has been built chiefly on the eastern and northern sides of the Acropolis, while the ancient city lay chiefly on the southern and western sides, and in its public

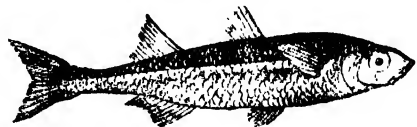
buildings and newer parts it reminds one of the better-built German cities. Its present population is about 85,000, that of the Piræus being more than 30,000. It has a gymnasium on the German model, a school for the higher education of girls, several private schools of excellent character, a polytechnic school, and a university which numbers more than 50 professors in the various faculties, and about 1400 students. A railway connects Athens with the Piræus, and tramways run to outlying villages. Except in the back streets and remote corners, one would hardly think of Athens as at all an oriental city. Its two chief business streets, 'Hermes' and 'Æolus,' cross each other at right angles, and divide the city into four nearly equal parts. Of modern public buildings the most noteworthy are the University, the Academy, which is built almost wholly of marble and shows with beautiful effect the polychromatic decorations of the ancient Doric style, the Exposition Hall, and the Palace, externally an ugly square building, but containing some spacious and handsome salons. Among the most recent erections are a magnificent building for the national library, and a fine theatre. Both these structures, as well as the Academy and the Exposition Hall, are the gifts of wealthy Greeks, who reside mostly abroad, and take this way of showing their interest in the prosperity of their native country. Athens has become a centre of archaeological interest and study. Aside from the monuments mentioned above, it has many remains of antiquity stored and exhibited in its three museums. At the eastern end of the Acropolis, the Archaeological Society of Athens has erected a low building in which are preserved the remains and fragments of ancient art that have been exhumed on the Acropolis. The most noteworthy of these are several slabs of the Parthenon frieze, a few reliefs of the beautiful balustrade of the Temple of Wingless Victory, fragments of the frieze of the Erechtheum, and the fourteen archaic statues of divinities or priestesses found in 1886 west of the Erechtheum. The museum contained in the Polytechnicum embraces the Mycæne collection made by Dr Schliemann, a large number of figurines from Tanagra, Myrina, and other places, and a collection of vases illustrative of every period in the history of vase-painting. The National Museum is especially rich in archaic statues and in sepulchral stelæ and reliefs. The Greek Archaeological Society generously affords every facility to foreign students who are pursuing archaeological studies, and is constantly expending considerable sums of money in carrying on excavations. At present the entire surface of the Acropolis is undergoing excavation under its supervision. Interest in these researches has been greatly stimulated by the planting of foreign archaeological schools at Athens, of which there are four. The French school was established in 1846, and possesses a good library and a small but choice museum. The German Institute was opened in 1873, and has been very active in carrying on researches, the results of which are published in an annual volume entitled *Mittheilungen des Deutschen Archæologischen Instituts*. The French school issues a similar publication called *Bulletin de Correspondance Hellénique*. Both these schools are supported by their respective governments. The American school was founded in 1882, and is maintained by the co-operation of twelve of the leading colleges, and by the friends of classical studies in the United States. The British school was opened in 1886, and is under the patronage of the society for the promotion of Hellenic studies. As ancient Athens was for so many centuries the intellectual centre of the world, so the undecaying interest and charm that attaches to the remains of this ancient home of art and

science, beautiful even in ruin and decay, attract more and more the student and the tourist to the 'violet-wreathed city of Athena.'—The principal Athenians are treated of in separate articles. See also GREECE, ART, SCULPTURE; and Dyer's *Ancient Athens: its History, Topography, and Remains* (Lond. 1873); Bursian, *Geographie des Griechentums* (1873), important for antiquities and art; Wachsmuth, *Stadt Athen* (vol. i. 1874); Burnouf, *La Ville et l'Acropole d'Athènes aux divers époques* (Par. 1877); Curtius and Kaupert, *Atlas von Athen* (Berlin, 1878); Forbiger, *Griechenland im Zeitalter des Perikles* (3 vols. 1882); and Milchhöfer's, *Athen* (in *Baumeister's Denkmäler des Klassischen Altertums*, Munich, 1884).

Athens, a name applied to more than twenty places in the United States. (1) The most important of them is a thriving town in Georgia, 92 miles WNW. of Augusta. It is the terminus of a branch railway, which joins the Georgia Central. It contains several cotton factories, and is the market for an extensive cotton-growing region. It is the seat also of the university of Georgia (1801). Pop. (1871) 4251; (1881) 6099.—(2) A town in the south of Ohio, on the Hocking River, has considerable trade with the surrounding country, and is the seat of the Ohio University (1804), and of the state lunatic asylum. Pop. (1880) 2457.

Atherfield Clay, the lowest subdivision of the Lower Greensand (see CRETACEOUS SYSTEM), varying in thickness from 20 to 60 feet. It rests directly on the Wealden (q.v.). It takes its name from Atherfield, on the SW. coast of the Isle of Wight. It is of marine origin.

Atherine (*Atherina*), a genus of small fishes, allied to the Gray Mullet family (*Mugilidae*), but latterly separated into a distinct family, *Atherinide*. The atherines have more than twice as many vertebrae as the gray mullets; they are of a rather slender form, but few of them exceed six inches in length. They have a protractile mouth and feeble dentition. Almost all the known species, which are numerous, and found in the seas of different parts of the world, have a broad silvery band along each side. Some of them are much esteemed for their delicacy. They occur in great shoals, and are very abundant in the Mediterranean. One species, *Atherina presbyter*, is very common on the south coast of England and on some parts of the coast of Ireland, but is rare on the east coast of Britain. In the markets of some of the southern towns of



Atherine (*Atherina presbyter*).

England, where the Smelt (q.v.) is unknown, the atherine is sold under that name; in Brighton and some other places, it is called *Sand Smelt*. Where this fish abounds, it is often taken by anglers from the shore, biting readily at almost any bait. There is also a North American species of small economic importance.

Atheroma (Gr., from *athērē*, 'meal,' 'meal-porridge'), a name formerly applied to cysts on the scalp with contents of the consistence of porridge, but now only used of a common form of inflammation of arteries. See ARTERIES (Diseases of).

Atherstone, an old market-town of NE. Warwickshire, 14 miles N. of Coventry by rail. Lying on the Roman Watling Street, it has a grammar-school (1573), and manufactures of hats,

stockings, and ribbons. Drayton was born close by. Pop. (1881) 4645.

Atherton, a township of Lancashire, 13 miles WNW. of Manchester. There are extensive coal-mines, and the inhabitants are chiefly employed in cotton factories and iron-works. Pop. (1871) 7581; (1881) 12,602.

Athletic Sports.—I. *Classical.*—We have an account in Homer (*Iliad*, xxiii.) of the sports held at the tomb of Patroclus, in which all the best Greek athletes competed. The athletes who competed at the great Greek open meetings—the Olympian, Pythian, Nemean, and Isthmian, and the more local Panathenæan—were as a rule professionals specially trained. At first their diet was only cheese, figs, and wheaten bread, but afterwards meat was added. We are told that some of these heavy-weight athletes were great eaters, that they practised digging to strengthen their arms and shoulders, and that only very strong men could win in the *Pancration*, a mixture of boxing and wrestling answering to the modern prize-fight. Milo of Croton is said to have slain an ox with a blow of his fist, and then eaten it in one day. Such gorging must have been fatal to athletic powers, while the other facts show that the ancient athletes must have been ignorant of 'form' and 'science.' At these great games the chief athletic competitions were long-distance races, jumping, throwing the *discus*, wrestling, boxing, and the *pancratium*. No one could compete above the age of thirty-five. The usual prizes were wreaths of bay, olive, or parsley. Cyrene was famous for its athletes, and there are in the British Museum six prize vases won by Cyrenians at the Panathenæa. Winners at the great games were feted on their return home, and thenceforth kept at the public expense. Dishonesty was then as now not unknown, and fines were inflicted on athletes for 'selling' a race. Enthyamus, Milo, Hippotheses, Polydamas, and Promachus were some of the most famous strictly professional athletes, while among the amateur winners were Plato, Pythagoras, and Cleanthes. In 186 B.C. M. Fulvius introduced athletic sports at Rome, where, though they became popular under the empire, they were always confined to Greeks.

II. *Old English.*—Excluding hunting, hawking, and similar pursuits of the rich, we may give the following as old sports of the people, mostly dating from the middle ages—namely, archery, bull and bear baiting, cock fighting, running, jumping, throwing the bar, running at the quintain, tennis, pall-mall, broadsword, quarterstaff, bastard (blunted) sword, singlestick. Quintain was engaged in by Oxford undergraduates as late as 1835. Casting the bar or the sledge-hammer, which answers to our throwing the hammer, was a favourite sport of that first-rate all-round athlete, Henry VIII. The Londoners have always been famous for their love of athletic sports. The Cotswold Games, over which R. Dover, attorney of Barton Heath, Warwick, presided, was a famous meeting in the 16th and 17th centuries. James I. gave them a special license. They were held at Dover's Hill on the N.E. Cotswolds near Honeybourne, and are described in *Annalia Dubrensis* (1636) and the *Cotswold Muse*. In the *Scouring of the White Horse* (Hughes) we have an account of a similar meeting in Berks. The carnival at Radgaver Moor near Bodmin, also famous for its sports, was visited by Charles II. In Westmoreland and Cumberland athletic meetings have long been popular.

III. *Modern English.*—The oldest athletic sports are those of the Royal Military College, Sandhurst, which date from 1812. The following is a calendar of the most important dates in the history of modern athletics:

1840. Woolwich, Eton, Harrow, Rugby, and Shrewsbury began to have sports.

1853. Oct. 22, Cheltenham College held its first sports after the modern fashion, which makes a regular fête of them. Cheltenham now takes two afternoons for its sports, and is the only school which has a grand stand of its own. Eton and Harrow still have their races at intervals on various days.

1855. College Athletic Sports at Oxford and Cambridge began.

1864. Inter-Varsity (Oxford v. Cambridge) Sports established.

" Mining Lane Athletic Club established.

1866. Amateur Athletic Championship Sports established.

1867. Irish Civil Service Sports established at Dublin.

" Mining Lane Athletic Club renamed London Athletic Club.

Chief Athletic Clubs.—The London Athletic Club (600 members) holds six meetings in the year at its grounds at Stamford Bridge, West Brompton, and is the largest and most important athletic club in the kingdom. The Oxford and Cambridge, Civil Service, Birchfield, Liverpool, South London Harriers, Beckenham, Surbiton, and Lewes clubs are also of note.

Chief Athletic Meetings.—London: The Oxford and Cambridge Sports at Lillie Bridge on the Friday before the boat race; Amateur Championship, Civil Service, London Athletic Club, United Hospitals, Railway Clearing-House, and Surbiton Sports. *Provincial:* Lewes, Brighton, Scarborough, Birmingham, Liverpool, Leicester, &c. In fact, every town in England of 10,000 inhabitants or more has its athletic, bicycle, and cricket clubs and annual sports. The annexed table will show the advance made in athletic 'records' during twenty years. A record is the best authenticated performance on record up to date, and when surpassed is said to be 'cut,' 'lowered,' or 'broken.' The figures in the 1864 column refer to the Oxford and Cambridge Sports of that year. The slowness of the times twenty years ago, and the unscientific way in which records were generally kept, may be seen in the following passage from Stenhouse's book on sports of 1864, figures being substituted for letters, and the 1886 records added in brackets. 'Quarter of a mile has been run in 1 min. (48 sec.); half a mile, in 2 min. 25 sec. (1 min. 55 sec.); a mile, 4 min. 30 sec. to 5 min. (4 min. 18½ sec.); two miles, in rather less than 10 min. (9 min. 17½ sec.); four miles, in 20 min. 30 sec. (19 min. 39½ sec.); ten, in 1 hour (51 min. 20 sec.); fifteen, in 1 hour 35 min. (1 hour 24 min. 24 sec.); and twenty, in 2 hours 15 min. (1 hour 58 min. 44 sec.).' The figures and names in brackets in the 1886 column of the table give the records and names of professionals, between whom and amateurs an authorised distinction was first drawn in 1860 (see AMATEUR). U.S.A. means that the record was made in America.

From the table it will be seen that the American L. E. Myers holds three records, and W. G. George five; while six of the seventeen are held by American amateurs. Very few of these amateur records are older than 1880. George, who obtained the amateur as well as the professional record for a mile, lost his amateur status in 1885. We should notice among important events the dead heat between J. W. Lang, Christ Church, and C. H. Long, Trinity, in the two miles at the Oxford and Cambridge Sports in 1866, and that in the three miles between R. H. Benson (Balliol) and E. M. Hawtrey (John's), in 1872. In 1885 the three matches between W. G. George, hitherto an amateur, and Cummings of Paisley, attracted much attention. In the mile race Cummings, who had held the professional record for a mile (4 min. 16½ sec.) for years, broke down 350 yards from the winning-post, and George won in 4 min. 20½ sec. This took place at Lillie Bridge Grounds, London, August 31. In the four-mile race run at Powderhall, Edinburgh, September 12, George broke down, and Cummings, after going 3¼ miles, was stopped by

the crowd, so that no time for the four miles could be taken. In the ten-mile race run at Lillie Bridge,

September 28, Cummings won easily in 51 min. 6½ sec.

1880.

100 yards.....			10½, 10 sec.	L. E. Myers, U.S.A.
120 yards hurdles..	17½ seconds.	A. Daniel.	seconds.	(9½ sec., H. M. Johnson, U.S.A., 1886.)
300 yards.....			seconds.	C. N. Jackson, 1865. C. F. Daft, 1886.
Quarter mile.....	53 seconds.	B. Darbyshire.	seconds.	L. E. Myers, U.S.A.
One mile.....	4 min. 56 sec.	C. B. Lawes.	4 min. 18½ sec.	(30 sec., H. Hutchens, 1884.)
Mile walking.....			6 min. 29½ sec.	L. E. Myers.
Two miles.....	10 min. 38½	R. Webster (1865).	6 min. 34½ sec.	(48½ sec., R. Battery, 1873.)
Three miles.....	15 min. 20 sec.	J. H. Morgan (1868).	14 min. 30 sec.	W. G. George, 1884.
Ten miles.....			51 m. 20 sec.	(4 min. 12½ sec., W. G. George)
Wide jump.....	18 feet.	F. H. Gooch.	23 ft. 3 in.	J. P. Murray, U.S.A., 1883.
High jump.....	5 ft. 5 in.	F. H. Gooch.	6 ft. 2½ in.	H. Whyatt, 1883.
Putting 16-lb. weight..	32 ft. 10½ in.	G. W. Ellicott.	6 ft. 2½ in.	(6 m. 23 s., W. Perkins, 1874.)
Throwing 16-lb. hammer	87 ft. 10 in.	G. R. Thornton.	43 ft. 9 in.	W. G. George, 1884.
Throwing cricket-ball..			138 ft. 3 in.	(9 m. 11½ s., W. Lang, 1863.)
Pole-vaulting.....			126 yd. 1 ft. 6 in.	(14 m. 36 s., J. White, 1863.)
One hour's running....			11 ft.	W. G. George, 1884.
One hour's walking....			11 miles 932 yd.	(51 min. 6½ sec., W. Cummings, 1885.)
Half-mile			7 miles 1318 yd.	M. W. Ford, U.S.A., 1886.
			1 min. 55½ sec.	(21 ft. 6½ in., E. A. Johnson, Canada, 1870.)
			1 min. 57 sec.	P. Davin, 1880.
			1 min. 57½ sec.	(6 ft. 1 m., E. A. Johnson, U.S.A.)
				M. J. Brooks, 1876.
				J. O'Brien, 1885.
				(42 ft. 6½ in., D. Ross, U.S.A.)
				G. H. Hales, 1876.
				W. H. Game, Oriel College, Oxford, 1873.
				T. Ray, 1885.
				(10 ft. 10½ in., G. Musgrove, 1866.)
				W. G. George, 1884.
				(11 miles 970 yd., L. Bennett, 1863.)
				J. R. Clark, U.S.A., 1880.
				(5 m. 302 yd., J. Mengler, U.S.A., 1881.)
				L. E. Myers, U.S.A., 1882 and 1885.
				F. K. Cross, Feb. 26, 1887, at Oxford.
				(1 min. 53½ s., F. Hewitt, Sydney, 1871.)
				F. T. Elborough, 1876.

Cross-country Sports.—Rugby may be said to be the cradle of paper-chasing, and has always taken the lead among schools at that sport. Early in the century the fags carried the paper, while the preceptors, armed with horse-whips, were the huntsmen, and some even hired horses to follow the line. This, however, led to the stoppage of the sport by order from 1820-30. About 1850, paper-chases took place once a week for five months of the year, but now the runs are in February, March, and April, when football is going out and it is too cold for cricket. The chief Rugby 'run' is the 'Crick' (12½ miles), for which the best record is 1 hour 16 min. 54 sec.

The chief London-Suburban cross-country clubs are the Thames Hare and Hounds, the South London, Blackheath, Spartan, Ranelagh, Finchley, and Hampton Court Harriers. The chief provincial are the Liverpool, Huddersfield, and Moseley Harriers, and the Oxford and Cambridge University Hare and Hounds clubs. The London clubs usually meet on Saturdays for a run over a course tolerably familiar. They either (1) make the best of their way throughout, or (2) appoint a 'pace-maker' to regulate the speed of the hounds, so as to give the feeble runners a chance, or (3), after the hares have had their 'law', start the 'slow pack' first, and the fast pack afterwards. In the cross-country races for prizes, the trail is carefully laid beforehand by two veterans, and the runners are handicapped by time starts, each being despatched from the same starting-place. Sometimes all the competitors are started together, each being allowed so many minutes and seconds, which are deducted from the time he takes for the whole distance, and he whose time comes out the shortest is declared the winner. This is called a 'yacht race.' One of the great cross-country events is the Southern Counties Cross-country 'championship meeting.' That club whose first six men gets fewest marks is declared champion—e.g. at the

Kempton Park meeting (1887) the six Finchley Harriers were 10, 13, 14, 16, 21, and 27 in order of merit, and so got the lowest marks of any club, 101. Most clubs enter twelve candidates. At Sandown Park racecourse, 159 runners from 14 clubs started in 1884; *ib.* 161 from 14 clubs, 1885; *ib.* 183 from 16 clubs, 1886; and at Kempton Park racecourse, 159 from 14 clubs, 1887. Distance, 'a little over ten miles.' There were a fair number of fences, but as long as runners are allowed to scramble or vault over fences, it cannot be called genuine cross-country work. The touching of any fence with the hands should be made a disqualification.

Athletics in Scotland and Ireland.—Athletic meetings proper have only lately become popular in Scotland, and are chiefly confined to the south. In the east, the chief meetings are the Edinburgh University, Edinburgh Harriers, and Inter-scholastic; and in the west, the Queen's Park and West of Scotland Sports at Glasgow. The Highland Games at Braemar, Inverness, Edinburgh, Aberdeen, Luss, the Border Games, &c. are semi-professional gatherings which include dancing as well as races, and tossing the caber, and are something like the Old English sports already noticed. No amateur record has ever been made in Scotland. In Ireland, Dublin University has always taken the lead in athletics. The Irish Civil Service Sports were established at Dublin in 1867; and now there are meetings at Belfast, Cork, Carrick-on-Suir, Galway, Kingstown, &c. The leading club is the Irish Champion Athletic Club. —*Training* is treated at ROWING. See also the article GYMNASTICS.

Athlone, a town in the centre of Ireland, lies on both sides of the Shannon, chiefly in Westmeath, but partly in Roscommon, 3 miles below Lough Ree, and 80 W. of Dublin by rail. The chief manufactures are felt-hats, friezes, linens, and staves. The Shannon is crossed by a fine bowstring and lattice iron bridge of two arches, 175 and 40

feet span. Till 1885 Athlone returned one member to parliament. Athlone Castle, founded in the reign of King John, was one of the chief military positions in Ireland. In the war of 1688 it was unsuccessfully besieged by William III. in person, but was afterwards taken by General Ginkell. The fortifications cover 15 acres, and contain barracks for 1500 men. Pop. (1881) 6755.

Ath'ole, a district in the north of Perthshire, occupying a great part of the southern slopes of the Grampians, and giving the title of duke to a branch of the Murray family. See BLAIR-ATHOLE.

Athos (Gr. *Hagion Oros*, It. *Monte Santo*, 'Holy Hill'), the most eastern of the three tongues of the Chalcidæe Peninsula on the Ægean Sea, connected with the mainland by a low and narrow isthmus, about a mile across. The length of the peninsula is about 31 miles; its breadth varies from 3 to 6 miles. At the southern extremity, a solitary peak rises abruptly to a height of 6346 feet above the sea. In ancient times, several towns were built on the peninsula, five being mentioned by Herodotus. The Persian king Xerxes cut a canal through the isthmus, to escape the stormy gales which rendered the navigation round the promontory very perilous, and which had shattered the fleet of Mardonius some years before. Traces of this canal still exist. This peninsula is celebrated as the seat of a kind of monastic republic, consisting of twenty large monasteries, besides numerous hermitages and chapels. The entire number of monks who inhabit the 'Holy Hill' is about 6000. The whole community is governed by an administrative body of four presidents, one styled 'First Man of Athos,' and a representative body called the Holy Synod, consisting of twenty members, one from each monastery. They enjoy complete autonomy, subject to paying the Turkish government an annual tribute of about £3500. The monks follow the rule of St Basil, and lead an ascetic life, restricting their diet to herbs, fruits, and fish. They are employed in agriculture, gardening, the care of bees, and the manufacture of amulets, images, crucifixes, and woollen articles of furniture, which they sell, while they also reap profits from the numerous visits of pilgrims. Goyes, the principal place in the peninsula, is picturesquely situated in the midst of vineyards and gardens, and has 1000 inhabitants. Here the market is held; but no female, even of the lower animals, is permitted to be present, or even to enter the peninsula. In the middle ages, Athos was the centre of Greek learning and Christian-Byzantine art. Now learning is at a very low ebb; scarcely more than two or three monks of tolerable education can be found in a monastery. The libraries are neglected, though containing several beautiful (but not important) old manuscripts. See Athelstan Riley's *Athos, or the Mountain of the Monks* (1887).

Athy', the chief town of County Kildare, Ireland, on the river Barrow, here joined by the Grand Canal, 45 miles SW. of Dublin by rail. It has a large grain-market. Pop. (1881) 4181.

Atitlan, a Central American lake, in the department of Solola, in Guatemala, 24 miles in length, and 8 to 10 miles in breadth. It seems to occupy the crater of an extinct volcano, and is of great depth, no soundings, it is said, being obtainable with a line of 1800 feet. It has no visible outlet, though several small streams run into it. High cliffs, almost bare of vegetation, surround the lake, and on its southern bank the volcano of Atitlan rises 12,538 feet above the sea. At the foot of the mountain lies the little Indian town of Santiago de Atitlan, with a pop. of 2000.

Atlanta, a flourishing city of the United States, capital of Georgia, and seat of justice of Fulton County, is situated 1100 feet above sea-level, on an elevated ridge dividing the waters of the Chattahoochee River from the rivers that flow into the Atlantic, 294 miles NW. of Savannah. It has a remarkably healthy and equable climate, the mean annual temperature being about 60° F. It is 7 miles SE. of the Chattahoochee River. Seven railroads centre at Atlanta, the most of which are trunk-lines with numerous connections. Atlanta has an extensive and rapidly increasing trade in cotton, dry goods, and horses and mules; and in tobacco the trade is larger than that of any place south of Richmond, Virginia.

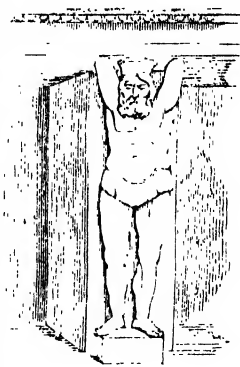
Atlanta possesses iron-foundries and large flouring-mills, a rolling-mill, a manufactory of agricultural implements, paper-mills, three well-equipped cotton-mills, &c. The chief public buildings are the custom-house, state-house, and opera-house. An excellent system of public schools was organised in 1872, and comprises primary, grammar, and high schools for white and coloured. Other institutions are the Atlanta University for the education of coloured young men and women, Clark Theological School (coloured Methodist), and two medical colleges. The city limits comprise a perfect circle, with a diameter of 3 miles, and with its centre at the Union Passenger Depot. In the civil war, the city was captured by the Union troops under General Sherman (September 2, 1864), and the entire business portion was destroyed by them on leaving it about a month later. Since the restoration of peace, however, its prosperity has been uninterrupted and its growth rapid.

Atlanta was settled in 1840; was incorporated as the village of Marthasville in 1842; as Atlanta, in 1847. Pop. (1850) 2572; (1860) 9554; (1870) 21,879; (1880) 37,409; (1890) 65,533. A great cotton 'Exposition' was held here in 1885.

Atlantes, in Architecture, so called by the Greeks in reference to the mythical Atlas (q.v.), are male figures used instead of columns. The Romans called them Telamones. Female figures employed in this way are called Caryatides (q.v.).

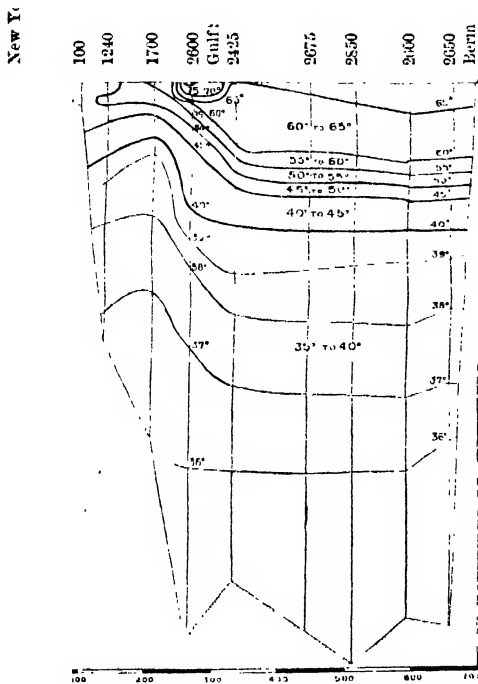
Atlantic City, a fashionable American health-resort, is situated on a narrow, sandy island off the coast of New Jersey, 60 miles SE. of Philadelphia by rail. A good beach attracts a large number of summer visitors. Incorporated in 1854, the place has grown rapidly; its wide avenues are now lined with handsome cottages and villas, and lit with the electric light. Pop. (1870) 1043; (1890) 13,055.

Atlantic Ocean. The Atlantic Ocean, so called either from Mount Atlas or from the fabulous island of Atlantis, separates the Old from the New World, Europe and Africa being on the E., and North and South America on the W. Its greatest width is about 5000 miles, but between Brazil and the African coast the distance is only about 1600 miles. It is in open communication with both the Arctic Ocean and Antarctic or Southern Ocean. The North Atlantic, stretching from 70° N. to the



Atlas Column, from the Baths at Pompeii.

equator, has an area of 14,000,000 sq. m. It communicates with many inclosed or partially inclosed seas, such as the Caribbean Sea, Gulf of Mexico,



Section c' of the North Atlantic Ocean, across the Gulf Stream, between New York and Bermuda:

Showing the Soundings (in fathoms) and Isothermal Lines obtained in H.M.S. *Challenger*. The vertical scale, as compared with the horizontal, is as 400 to 1; so that the inclines are 400 times less steep than represented. It was necessary to adopt this exaggerated scale in order to show the relative position of the Isothermal Lines.

and Hudson Bay on the west, the Baltic, North Sea, Mediterranean, and Black Sea on the east, whose combined areas are about 3,400,000 sq. m. The South Atlantic from the equator to 40° S. has an area of 10,100,000 sq. m.; if it be supposed to extend through the great Southern Ocean as far as the Antarctic circle, its area is 16,700,000 sq. m. Including the Arctic Ocean and the other seas with which it is in open communication, the Atlantic has a drainage area of 26,400,000 sq. m. On this land, draining directly or indirectly into the Atlantic, Mr Murray estimates there is a rainfall of 15,800 cubic miles annually, and that the annual discharge of rivers into the Atlantic is 3400 cubic miles of water, equal to about one-half the rainfall and river discharge of the world.

Towards the centre of the North Atlantic, between Africa and North America, and in the centre of the South Atlantic, between Africa and South America, there are anticyclonic areas of high atmospheric pressure (over 30 inches), out of which winds blow in all directions to surrounding regions where the pressure is less. For instance, to the westward of North Africa, the prevailing winds are northerly and north-easterly; on the south side of the anticyclonic region they are easterly; and on the west, off the North American coast, they are southerly. A similar system of winds prevails in the South Atlantic. The positions of these high-pressure areas and the winds that blow out from them, determine

the great oceanic currents and the positions of the Sargasso seas, for the winds everywhere determine and control the movements of the surface waters. The SE. and NE. trades drive the heated surface waters of the tropics before them, and eventually produce the *Equatorial current*, which on reaching Cape St Roque bifurcates, one branch becoming the *Brazil current* of the South Atlantic, the other and larger branch passing on to the Caribbean Sea and Gulf of Mexico, finally issuing from the latter by the Strait of Florida, forming the *Gulf Stream*, the greatest and most important of all oceanic currents. The Gulf Stream spreads out over the Atlantic to the south of Newfoundland; one prolongation of it returns to the tropics off the coasts of Spain and Africa, the other passes north between the British Isles and Iceland, and on to the coasts of Norway, which are thus rendered habitable, while the opposite coasts of Greenland are ice-bound. A cold Arctic current passes southward along the shores of Greenland, and unites off Cape Farewell with the Davis Strait current, forming the *Labrador current*, which passes along the west coast of America, and passes beneath the Gulf Stream to the south of the banks of Newfoundland. Icebergs are carried as far south as 40° N. in the northern and as far north as 38° S. in the southern hemisphere. In the equatorial regions, the surface water has generally a temperature ranging from 70° to 84° F.; the temperature decreases as the depth increases, the coldest water being found at the bottom. The warm water is a relatively thin stratum, the greater part of ocean water having a temperature below 40° F. It is ice-cold in the Atlantic at the bottom even beneath the equator; the ooze dredged from the bottom beneath a tropical sun is so cold that the hand cannot be placed in it without great discomfort. The low temperature of deep ocean water is acquired in the polar regions chiefly in the high latitudes of the southern hemisphere.

The warm salt water carried into the North Atlantic by the Gulf Stream slowly sinks on account of the reduction of temperature on reaching higher latitudes, and carries heat down with it, consequently relatively warm water is found at a greater depth in the North Atlantic than in any other ocean. A temperature of 45° is found off the north of Scotland at a depth of 600 fathoms (three-fourths of a mile), while off the west coast of Africa a similar temperature is met with at only 200 fathoms beneath the surface. The temperature of the ocean is colder off the leeward shores of continents than on the weather shores, as the cold deep water is drawn up to the surface to supply the place of that driven before the winds: this is probably the reason why coral reefs are absent in the eastern parts of the ocean in the tropics, while they flourish in the western. The water of the Atlantic is freshest—that is, contains the least salt—towards the poles and in the equatorial belt of calms. The saltiest water (density over 1.0275) is found in the centre of the trade wind regions. This is not, however, so salt as the Mediterranean and Red Sea (over 1.0280). The salinity of the deeper waters is considerably below the average of the surface. The average depth of the Atlantic is between 2 and 3 miles (2200 fathoms). A low submarine ridge runs down the centre, from north to south, with an average depth of about 1700 fathoms over it. On either side of this ridge there are, both in the North and South Atlantic, depths of between 3000 and 4000 fathoms. The greatest depth yet met with is just north of the Virgin Islands, where a sounding of 4561 fathoms has been obtained. The deposits towards the central portions of the Atlantic are chiefly made up of the dead calcareous shells of

ATLANTIC OCEAN



organisms which have fallen from the surface. On the central elevation, where the depths are less than 1500 fathoms, the deposits are largely made up of the shells of pelagic Molluscs, and the deposits are called *Pteropod ooze*; from 1500 to 3000 fathoms, the shells of pelagic Foraminifera prevail, and the deposits are named *Globigerina ooze*. In depths greater than 3000 fathoms there is a reddish clay, chiefly made up of disintegrated pumice and other volcanic material. Near the shores there is a mixture of land débris and surface organisms, and the deposits are red and blue muds, green glauconitic muds and sands, coral and volcanic muds and sands. The surface waters from equator to poles swarm with all kinds of pelagic plants and animals, many of which emit phosphorescent light, producing what is known as umminosity of the sea. In the centre of the North Atlantic, in the so-called Sargasso Sea, there are enormous floating banks of gulf weed (*Sargassum bucciferum*), on which a large number of peculiar animals live. Life has been found to exist at all depths in the Atlantic, but it becomes less abundant as greater depths and a greater distance from continental shores are reached. There are relatively few oceanic islands. Iceland, the Azores, St Paul's Rocks, Ascension, and the Tristan da Cunha group all from the central elevation, and are all of volcanic origin. Jan Mayen rises from the deep water of the Norwegian Sea. The coral group of Bermudas rises from the deep water of the Western North Atlantic. Off the west coast of Africa are the Canaries, Cape Verdes, and Madeira. In the South Atlantic, to the west of the central ridge, are Fernando Noronha and Trinidad, and to the east of the central ridge, St Helena. There are numerous continental islands, such as the British Isles, Newfoundland, the West Indies, the Falklands, and others. The most civilised nations of the world inhabit the shores of the Atlantic, and it is the great commercial highway of the world. Its coasts are better surveyed, better provided with lighthouses, and its winds and currents better known than those of any other ocean. It has been sounded in all directions, and the nature of its bed is so well known that telegraph cables can be laid across it with great certainty of success. In the neighbourhood of some continental shores, and around some of the volcanic cones which rise from the floor of the ocean, there are occasionally very steep slopes; but as a rule, the bed of the ocean is a widespread, gently undulating plain. The GULF STREAM has a separate article (q.v.).

Atlantic Telegraph. The union of the Old and New Worlds by means of the electric telegraph, probably the boldest feat of electric engineering ever projected, was first suggested by Professor Morse in 1843. Various reasons prevented his ideas taking practical shape, the principal obstacle being the unknown depth of the Atlantic and the supposed rocky nature of the bottom. When, however, Lieutenant Murray of the United States navy discovered that between Ireland and Newfoundland the bed of the ocean was nearly level and covered with soft ooze, and Mr Cyrus Field and others had thoroughly discussed the practical methods, a company was formed for the purpose in 1856, to which the governments of Great Britain and the United States gave liberal guarantees.

This company, after a fruitless attempt to lay an electric cable in 1857, finally succeeded in 1858.

The cable, 2500 miles long, and weighing one ton per mile, was composed of seven fine copper wires, cased in gutta-percha, contained in a casing of hemp saturated with pitch, beeswax, and oil, the outer sheath being composed of eighteen strands of seven iron wires each. It was taken, in equal portions, on board H.M.S. *Agamemnon* (91 guns)

and the United States frigate *Niagara*, spliced in mid-ocean, and finally landed; the one end by the *Agamemnon* at Valentia, Ireland; the other by the *Niagara* at Trinity Bay, Newfoundland.

The result was not encouraging. The current obtained through the wire was so weak that a congratulatory message from the Queen to the president, consisting of 90 words, took 67 minutes to transmit. After a few more messages the cable became useless.

In consequence of this failure, it was not until 1865 that capital was found to make another attempt. This time the cable was made still heavier, and the whole length, 2300 miles, weighing 4000 tons, was shipped on board one vessel, the *Great Eastern*. The paying-out journey was commenced at Valentia, but when the vessel was 1064 miles from that port, the cable broke from an accidental strain. After a fruitless effort to fish up the broken cable from the bottom, it was abandoned for the season. In 1866 another line, so modified in construction as to be both lighter and stronger than the previous one, was successfully laid by the *Great Eastern*. The 1865 cable was then, by means of the same vessel, grappled for, and brought up from a depth of two miles, spliced, and completed to Trinity Bay.

The practicability of laying an electric wire across the Atlantic being thus demonstrated, many lines have been projected, and several of them carried out. In 1869 a French company laid a line from Brest to St Pierre, off the south of Newfoundland. In 1873 a line was begun from Lisbon to Pernambuco in South America. This line, by means of a duplicate line from London to Lisbon, brings this country into direct communication with the whole of South America. Other two cables were laid from Valentia to Trinity Bay in 1874 and 1875. The latter, made by the Messrs Siemens, weighed only 880 pounds per mile, being the lightest cable planned for Atlantic telegraphy. One from Penzance to St Pierre was laid in 1879; another from England to Panama was completed in 1882; and in 1884 Messrs Bennett and Mackay's line was laid from Valentia to Torbay in Nova Scotia.

This multiplicity of Atlantic telegraph lines has had the usual effect of competition, in reducing the rates for the transmission of messages. When the first line was opened for messages, the rates were £20 for 20 words of 5 letters each, and 20s. for every 5 letters extra. The following year those rates were halved, and by successive reductions reached in August 1869 the rate of £1. 10s. for 10 words, and 3s. per word extra without restriction of number of letters. This rate has prevailed since, subject to occasional fluctuations consequent on disputes among the competing lines. One of these disputes caused in 1887 a reduction of the rates to 6d. per word on the part of all companies except one, which charged 1s. Still, even at the cheapest rates, long messages are very expensive. To obviate this as far as possible, several code and cipher schemes have been devised for transmitting lengthy messages by a comparatively small number of words. These schemes, subject to certain regulations, have been accepted by the post-offices and telegraph companies. The whole Atlantic system is worked in connection with the ordinary telegraph system of the world, and, with the lines to India and Australia, may be said to bring the uttermost ends of the earth within speaking distance.

See article TELEGRAPH for an account of the science and methods employed, and for the subject of Submarine Telegraphy.

Atlantis, according to ancient myth or tradition, the name of a vast island in the Atlantic Ocean. It is first mentioned by Plato in the *Timæus* and the *Kritias*. An Egyptian priest is

said to have told Solon of its existence, lying off the Pillars of Hercules in the ocean, and larger than Libya and Asia Minor together. In consequence of an earthquake, it is said to have been engulfed by the waves, nine thousand years before his time, at the close of a long contest which its inhabitants maintained against the Athenians. Plato says that shoals of sand marked the site of the submerged island. Some have thought that the Canary Isles are the remains of this sunken island. Bircherod, in his treatise *De Orbe Novo non Novo* (Altdorf, 1685), maintained that Phœnician or Carthaginian trading ships driven by storm had reached the American coast, and had returned thence bringing with them marvellous tales of the New World, which proved the basis of the widespread belief in Atlantis. It is remarkable that recent palæontological researches should have established the fact of there having really existed an Atlantis in Tertiary times. The Tertiary shells of the United States are identical with a whole series of fossils in the same beds of France. Also the Tertiary vertebrate animals in France have their analogues either in fossil creatures or in living species in America. On this account geologists are justified in concluding that in the Tertiary epoch a land connection existed between the two continents. The fossil flora of the two continents gives like results. Finally, Collomb and Vernenil have collected evidence to show that there actually did exist an enormous island to the west of Spain, whose rivers formed the vast marshy and delta deposits of the Tertiary period in Spain. This is, however, a pure coincidence. It is impossible to suppose any tradition existing of such an island or land. It must be remembered that the whole Celtic family held to a belief in the Land of the Dead being situated beyond the Western Sea, which they called Ghasinnis, or Avalon, and of which they told wondrous tales. Such stories may have reached the Greeks, and indeed we know they did, and were taken up by them and adopted into their mythology. They called this imaginary land in the ocean the Gardens of the Hesperides, or Isles of the Blessed. There can be little doubt that Plato's Atlantis is but another name for the same imaginary land, which is also spoken of on hearsay by Pliny, Diodorus, and Arnobius. In Lucian's masterpiece of wit and satire, the *True History*, the first place reached by the travellers is an island eighty days' sail westwards of the Pillars of Hercules. The *New Atlantis* of Bacon's imagination was an austral rather than a western continent, and the curious might recognise in it the modern Australia. The first stage in the journey to Campanella's 'City of the Sun' was a great southern continent, but the want of exploration under the Antarctic circle has left this still a mere imagination.

Atlantosaurus, a name given by Professor Marsh to what appears to be the largest deinosaurian reptile of which any remains have been preserved. The femur of this colossal monster is more than 8 feet in length. The size of the bone indicates a length for the animal of nearly 100 feet, and a height of 30 feet or thereabout. The remains were obtained in the Jurassic strata of Colorado.

Atlas, in Greek Mythology, son of the Titan Iapetus and Clymene, and brother of Prometheus and Epimetheus. He was father of the Pleiades and the Hyades. As leader of the Titans, he attempted to storm the heavens, and for this supreme treason was condemned by Zeus to bear the vault of heaven on his head and hands, in the neighbourhood of the Hesperides at the western extremity of the earth, where day and night meet,

on the mountains in the north-west of Africa still called by his name. Some supposed, however, that he was originally a man metamorphosed into a mountain; and Ovid explains that Perseus changed him by means of Medusa's head into stone for his inhospitality. Some tried to rationalise the myth, explaining Atlas as a mighty king who had great skill in astronomy, and only tried to storm heaven intellectually.

Mercautor, in the 16th century, gave the name *Atlas* to a collection of maps; probably because the figure of Atlas supporting the heavens had been given on the title-pages of such works. The name is also applied to a collection of illustrative plates, large engravings, or a conspectus of any subject arranged in tabular form. See MAP.

Atlas, the great mountain-system of North-western Africa, stretching from Cape Nun in Morocco to Cape Bon in Tunis, a distance of about 1400 miles. It is not properly a mountain-chain, but rather a very irregular mountainous mass of land formed of many chains running in various directions, meeting in mountain-knots, or connected by short chains of inferior height, and diversified still further by several solitary mountains and groups of mountains. The general direction is from south-west to north-east. Some limit the Atlas proper to Morocco, refusing to include the Algerian heights within the system. The French geographers apply to the latter the names of the Great and the Little Atlas—the native name is Idrar-n-Beren. At anyrate the principal chain, *Jebel Aiaschin*, is entirely within Morocco, forming a three-sided watershed to the Mediterranean, the Atlantic, and the Sahara. The Atlas attains its greatest height (about 13,000 feet) in Miltis—27 miles S.E. of the city of Morocco—Bibawan, and Tagherain. The most southern chain diverging here from the central mass bears the name *Jebel Hadmar*. The heights approach the sea, and form the promontories jutting out into the Atlantic. From Morocco, the Atlas gradually decreases in height towards the east. In Algeria, the elevation is only 7673 feet; in Tunis, 4476 feet; and in Tripoli, 3200 feet. The slopes on the north, west, and south are covered with vast forests of pine, oak, cork, white poplar, wild olive, &c. The valleys are well watered and capable of cultivation with great profit. The Atlas seems to be chiefly calcareous in its composition. The mineral wealth remains, however, almost wholly unexplored, though copper, iron, lead, antimony, &c. are stated to exist in abundance.

Atlas is that piece of the human vertebral column which articulates with the skull; in other words, it is the first cervical vertebra. It may be distinguished from the other six by its being without a body and spinous process, by its being a mere irregular bony ring, divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the segment in front being occupied by the tooth-like process of the second cervical vertebra or axis, and that behind, by the spinal marrow and its coverings. On either side the ring is very thick; each lateral mass is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra.

The atlas, with the occipital bone, forms the joint on which the head moves in bowing; and turns on the pivot of the second cervical vertebra, when we look from side to side.

Atlas, a kind of silk-satin manufactured in the East. The word is Arabic, and means 'smooth,' 'bare,' hence it has been applied to smooth silk cloth.

Atmolysis, a method of separating a mixture of gases by taking advantage of their different rates of passage through a porous septum. See DIFFUSION, GASES.

Atmometer, an instrument which can be used to determine the humidity of the atmosphere. Its action has not yet been fully investigated. It consists of a hollow ball of unglazed clay with a glass stem. The whole is filled with water and inverted in a dish of mercury. As the water, having passed into the pores, evaporates from the surface of the ball, the mercury rises in the stem. If much water-vapour be present in the atmosphere, condensation takes place in the pores, and the mercury falls in the tube.

Atmosph. ere (Gr. *atmos*, 'vapour,' *sphaira*, 'sphere') is the name applied to the gaseous envelope which surrounds the earth. The existence of an atmosphere is to us a matter of vital importance. We owe to its influence the possibility of animal and vegetable life, the modifying and retaining of solar heat, the transmission of sound, the gradual shading of day into night, the disintegration of rocks, and the occurrence of weather phenomena. In consequence of the action of gravity, the atmosphere assumes the form of a spheroidal stratum concentric with the earth, and presses heavily on its surface. It exhibits, in common with all fluid bodies, the usual characteristics of hydrostatic pressure, but its internal condition differs from that of a liquid inasmuch as its particles repel each other, and can only be held in proximity by external force. From this circumstance it follows that the volume of any portion of air varies much more under the influence of external pressure than that of an equal volume of water; hence, the stratum of air nearest the earth is denser than strata in the upper regions, where, from their being subjected to the weight of a smaller mass of superincumbent air, the repulsive force of the particles has freer play.

That air possesses *weight*, is illustrated by the following simple experiment. If a hollow glass globe of 5 or 6 inches in diameter be weighed first when filled with air, and then after the air has been extracted from it by means of the air-pump, it will, when thus exhausted, weigh sensibly less than it did before, and the difference of the two results will represent the weight of the quantity of air which has been withdrawn. It has been determined by Biot and Arago that 100 cubic inches of dry air, when the barometer is at 30 inches, and the thermometer at 60° F., weigh 31·074 grains. The law of Archimedes (see ARCHIMEDES, PRINCIPLE OF), that a body immersed in a fluid loses a part of its weight equal to the weight of the volume of fluid displaced by it, finds its application in air as well as in water. If a glass globe filled with air and closed be suspended at the extremity of the beam of a delicate balance, and be kept in equilibrium by a brass weight at the other extremity, and if the whole be then placed under the receiver of an air-pump, and the air extracted, the equilibrium previously existing in air will be disturbed, and the larger body will become the heavier. The reason of this is, that when first weighed, they each lose as much of their own weight as that of the respective volumes of air displaced by them, and are therefore made buoyant, though in different degrees, the ball with the larger volume having the greater buoyancy. In a vacuum, they are deprived of this buoyancy, and the larger body, suffering the greater loss, becomes sensibly heavier than the other. In like manner, a balloon filled with heated air or hydrogen gas is lighter than the volume of air displaced by it. It is therefore forced upwards till it reaches a stratum

of such density that the weight of the volume of air there displaced by it equals the weight of the balloon itself. In this stratum it will remain poised, or move horizontally with the currents to which it may be exposed.

In endeavouring to determine the *form* of the atmospheric envelope, it is necessary to bear in mind that, according to the law of fluid-pressure, in order to produce a state of equilibrium at the level of the sea, the pressure of the atmosphere must be equal at that level over the whole of the earth's surface. Gravity acts with less force on the air at the equator than on that at the poles, in consequence of the spheroidal form of the earth. It has there, in addition, to contend with the centrifugal force, which entirely fails at the poles, and which has a tendency to lighten the air by acting contrary to that of gravity. Hence we infer that, in order to produce the same pressure at the level of the sea, the atmospheric height at the equator must be greater than that at the poles, and that the atmosphere must therefore possess the form of an oblate spheroid, whose oblateness is considerably greater than that of the earth itself. The greater heat at the tropical regions must also have the effect of increasing the oblateness.

The *height* of the atmosphere has not yet been determined. That it must have a certain limit, is evident from the consideration that there must be a point at which gravity on the one hand, and centrifugal force and the repulsive action of the particles on the other, are poised; and beyond this point, the latter forces outbalancing the former force, the aerial particles would be borne away from the earth. As, however, the law of the diminution of temperature, which materially affects the repulsive action, is unknown for the upper regions of the air, it is impossible to calculate the height of the atmosphere from the relations of these forces. From the observation of luminous meteors, however, it is inferred that in an extremely attenuated form it even reaches 500 miles.

The *pressure* of the atmosphere is one of its most important properties. Its effect is exhibited in the action of the ordinary water pump. The piston is fitted air-tight in its cylinder; and on being drawn up, creates a vacuum. The water within the pump being thus freed from pressure, while that outside of it is exposed to the pressure of a column of air reaching to the surface of the atmosphere, is at once forced up by reason of the weight of air which it must rise to balance. The ascent of the water takes place till the piston has reached the height of nearly 34 feet, from which we conclude that a column of air is equal in weight to a column of water of the same horizontal section, and of the height of nearly 34 feet. As mercury is 13·6 times heavier than water, a mercurial column freed from atmospheric pressure at the one extremity, and subjected to it at the other, is 13·6 times less in height than the column of water, or about 30 inches. From the more convenient size of this column, mercury has been adopted as the standard for atmospheric pressure, and is employed in our ordinary Barometers (q.v.). A mercurial column of 30 inches in height, and 1 square inch in section, weighs 15 lb. (more accurately, 14·73), which gives us the equivalent weight of a column of atmospheric air of the same section. The word *atmosphere* is often employed to express this weight or pressure on a square inch of surface, so that when we speak, in Mechanics, of the pressure of steam on a boiler as amounting to three atmospheres, we mean a pressure of 45 lb. on the square inch. The pressure on a square inch being thus ascertained, we have merely to multiply it by the number of square inches on the earth's surface to obtain the total pressure or weight of the atmo-

sphere. It amounts to 11·67085 trillions of lbs., or about $\gamma\pi\pi\pi\pi\pi\pi$ of the earth's mass. It must be observed that the height of the barometric column is not a constant quantity, as it varies irregularly from time to time, and more or less regularly with the latitude, the region, the season of the year, and the hour of the day. At London, its mean height is 29·88 inches; at Paris, 29·92 inches. The pressure of the atmosphere in the northern hemisphere increases as we recede from the equator, reaching a maximum at 30° N. lat., and generally decreasing from 30° to 65°, where it again begins to rise. The greater height, about 30°, is restricted to the oceans immediately to the westward of continents. As the heat of the earth's surface increases the rarity of the air above it, and causes the air at the top of the heated column to overflow, we would expect that, during the year, the barometer would stand at a minimum in summer, and a maximum in winter, and this state of things substantially holds good over the continents, or land surfaces of the globe. But over the oceans of the higher latitudes pressure falls to the annual minimum in winter, and rises to the maximum in the early summer. The variations of atmospheric temperature which occur, with their effects, result in a regular variation of the pressure of the atmosphere during the 24 hours of the day. There are two maxima—one about 10 A.M., the other 10 P.M.; and two minima—at 4 A.M. and 4 P.M. The pressure of the atmosphere exercises a most important influence on the organism of the human frame. A man of ordinary stature is exposed to a pressure of about 14 tons; but as the air permeates the whole body, and presses equally in all directions, no inconvenience is found to result from it. From experiments instituted by the brothers Weber in Germany, it has been ascertained that the heads of the thigh and arm bones are kept in their sockets by the pressure of the atmosphere; and in balloon ascents the aeronaut often suffers from bleeding at the nose, lips, and even eyes. These facts seem to indicate that the strength of the blood-vessels has been adjusted with reference to atmospheric pressure.

Chemical Composition of the Atmosphere.—Recent chemical researches give the following as the mean composition of 100 volumes and of 100 grains of dry air:

	Volumes.	Grains.
Nitrogen.	79·02	76·84
Oxygen	20·94	23·10
Carbonic acid	0·04	0·06
	100·00	100·00

Besides the substances just named, other gaseous matters occur, but in quantities so small as not sensibly to increase the bulk of the atmosphere, such as ammonia and ammoniacal salts, carburetted and sulphuretted hydrogen, carbonic oxide, sulphurous and sulphuric acid, nitric acid, and perhaps iodine, the quantity and even the presence of which are affected by local and meteorological causes. Roughly speaking, then, dry air may be said to consist of 4 volumes of nitrogen and 1 of oxygen, with a slight admixture of carbonic acid, and a mere trace of several other substances. As, however, the air of the atmosphere is never found dry, we must add to the constituents already named watery vapour, the amount of which is constantly changing, according to locality, weather, wind, and temperature. It is stated that of 1000 grains of atmospheric air, the proportion due to aqueous vapour varies from a minimum of 4 to a maximum of 16 grains. By far the most active chemical constituent of the atmosphere is oxygen, to the agency of which are owing the existence of animal life, the maintenance of combustion, the rusting of

metals, and the occurrence of several other chemical phenomena too numerous to be detailed. A small portion of this oxygen occurs in the form of Ozone (q.v.), a modification which, according to recent chemical discoveries, plays an important part in the chemistry of the atmosphere. The nitrogen which forms the bulk of the atmosphere possesses few chemical properties of importance, but performs the important part of diluting the oxygen, which, if it occurred alone, would act with too great intensity. The presence of carbonic acid in the air is shown by the production of the white carbonate of lime in lime-water freely exposed to its influence. Carbonic acid is produced in all processes where carbonaceous matter unites itself with the oxygen of the air, such as in animal respiration, in combustion, in fermentation, in putrefaction, and similar processes. The green leaves of plants, on the other hand, possess, in presence of sunshine, the power of decomposing carbonic acid into its elements, absorbing the carbon for their own tissues, and restoring the oxygen to the atmosphere in its original purity. Between the processes above mentioned, on the one hand, and the action of plants on the other, the quantity of carbonic acid in the air is kept nearly constant. From the table it will be seen that 10,000 volumes of atmospheric air contain 4 volumes of carbonic acid. If it occurred in a much larger proportion, being poisonous, it would become dangerous to animal life; and if it occurred in a much less proportion, the vegetable world would lack its requisite nourishment. The other substances, of which a trace is always or only sometimes found in atmospheric air, are difficult to detect in the air itself, but are generally found dissolved in rain-water, more especially in that which has fallen immediately after a long drought. Of these, by far the most important and widely diffused are ammonia and ammoniacal salts, which are of essential importance to the vegetable economy, because, dissolved in the rain, they furnish plants with the nitrogen required by them for the production of their flowers and fruit. Nitric acid is detected in the air after thunderstorms, sulphuretted hydrogen in the tainted air of sewers and such-like places, and sulphurous and sulphuric acid only in the neighbourhood of chemical or smelting works. A considerable quantity of carbonic oxide and carburetted hydrogen escapes unconsumed from our furnaces; and although the latter gas is in addition given off to the air in marshy and bituminous districts, the two occur in almost inappreciable quantity in the atmosphere.

In addition to its gaseous constituents, the atmosphere contains solid substances in a state of exceedingly fine division, the presence of which is revealed in the sunbeam. Many of these minute particles, being the seeds or germs of plants and animals, must exert an important influence on the organic substances on which they may finally settle, inducing in many of them the conditions of disease or putrefaction. The results of the Krakatoa eruption of August 1883, and recent deep-sea dredgings in the Pacific, reveal that a large amount of meteoric and volcanic dust is suspended in the atmosphere; and if to this be added the fine dust particles, which Mr Aitken has shown to be essential as nuclei in the formation of fog and cloud, there is an amount of solid matter suspended in the air not hitherto suspected. See DUST, GERM THEORY.

When the composite nature of the atmosphere was first discovered, it was supposed to be a chemical combination of nitrogen and oxygen, but further inquiries have rendered this opinion highly improbable. When any two bodies unite with each other chemically, the substance which results from

their combination invariably possesses properties which the original constituents did not possess. Now the atmospheric union of oxygen and nitrogen is distinguished by no properties which may not be attributed individually to these gases. We have, then, in this respect, no indication that the atmospheric combination of oxygen and nitrogen is a chemical one. Again, when any composite gas is dissolved in water, the proportion of the ingredients dissolved in it is exactly the same as that in which they occur in the compound itself; but this is not the case with air dissolved in water, which is found to be richer in oxygen than atmospheric air. Now, as oxygen dissolves more readily in water than nitrogen, it is manifest that this larger proportion of oxygen arises from both gases acting independently of each other in respect to the water, a condition that would be impossible if they were in chemical union. From these and other corroborative facts, the atmosphere is considered to be simply a mechanical combination of the gases contained in it. This, however, does not prevent the atmosphere from having a uniform composition, as might at first sight be supposed; for when gases are mixed with each other, they may practically be regarded as intermingling thoroughly throughout the whole space occupied by them. Local causes may temporarily affect the relative proportion of the atmospheric ingredients, but the changes are so minute as to require the most delicate analysis to detect them.

Atmospheric Electricity. See ELECTRICITY (ATMOSPHERIC).

Atmospheric Engine. See AIR-ENGINE.

Atmospheric Railway. See PNEUMATIC RAILWAY.

Atoll (a Maldivian word), a form of Coral Island (q.v.), consisting of a more or less interrupted ring of coral rock, inclosing a central lagoon. As examples may be mentioned Whitsunday Island, Keeling Atoll, Bow Atoll, Peros Banhos Atoll. See CORAL ISLANDS, POLYNESIA.

Atom (Gr. *atomos*, 'that which cannot be cut') is a term properly belonging to the science of that class of physicists who deny the infinite divisibility of matter. It has a secondary, but unjustifiable, use among chemists.

Much of the very old speculation as to the ultimate constitution of matter has been preserved to us in the remarkable poem of Lucretius (q.v.). He follows the teaching of Democritus and Leucippus, basing his argument for the existence of atoms mainly upon the (supposed) result of observation that 'reproduction is slower than decay,' and therefore that there would now, after infinite ages of decay, be no aggregate left unless there were a limit to breakage. He ridicules the opposite theory, propounded by Anaxagoras (that of *Homœomeria*), which asserts that, however far a body may be divided, the parts are still similar to the whole, and therefore capable of yet further division. Epicurus (q.v.), and in modern times Gassendi (q.v.), are also notable representatives of the 'Atomic School.'

Modern science has made no advance towards the decision of this question. Even the Vortex-atom (q.v.) requires to be made up of a species of matter, and the postulates of that theory do not as yet require any speculation as to whether it is infinitely divisible or not. But, if the question of the existence of atoms (in the true sense of the word) has made no progress, that of the finite heterogeneity of all kinds of matter has recently advanced very fast.

Chemical and physical facts, of the most varied and independent character, unite in giving us the information that, even in such apparently texture-

less bodies as glass and water, after a certain finite amount of division, a stage is reached at which any further division breaks the body into fragments which are not necessarily similar to one another, nor to the original substance. For the chemical arguments on this subject, see ATOMIC THEORY, CHEMISTRY, and MOLECULE; for the physical ones, see GASES (*Kinetic Theory of*), and MATTER. In these articles the reader will find the latest data as to the probable size of the 'grain' in different kinds of matter. Further than this, no speculation of any value has yet been ventured upon.

Atomic Theory. What is known as the atomic theory is a theory as to the nature of the ultimate particles of matter, which, supported as it is by both chemical and physical evidence, has been of great service in the explanation of chemical facts, as well as in the progress of scientific chemistry.

Theoretical speculations as to the nature of the constitution of matter date from the earliest times of philosophy, but the gradual development of the atomic theory into its present form is owing to the accumulation of chemical and physical facts during a period of about a century. Matter has long been regarded as not being continuous, but as possessing a *grained* structure i.e. as being made up of extremely minute particles. These particles, or groups of such particles, are supposed to be arranged in any substance at a certain average distance from one another, such average distance depending not only upon the physical state of the substance—i.e. whether solid, liquid, or gas—but also upon the temperature and pressure.

The honour of having first formulated an atomic theory based upon experimental evidence, obtained from his own investigations and from those of his predecessors and contemporaries, falls to Dalton. Prior to Dalton's first publication, at the beginning of this century, of his contributions to the subject, a good deal of investigation had been made leading up to the establishment of a rational atomic theory, although it had not been fully recognised as such at the time. It was known that chemical compounds contained their elements in certain definite and fixed proportions. Moreover, by finding the quantities of various acids required to neutralise a given quantity of a particular base, and of various bases required to neutralise a given quantity of a particular acid, it had been ascertained that numbers could be assigned to each acid and base which represented quantities which were chemically equivalent. Thus a quantity of an acid, A, combined with a quantity of a base, B, to form a neutral salt, AB; the same quantity of A combined with a quantity of another base, C, to form a neutral salt, AC; and the same quantity of B combined with another acid, D, to form a neutral salt, DB. The important point which had been established was, that the quantity of acid D in DB, and that of base C in AC, combined to form another neutral salt, DC. It was also known that the quantities of various metals dissolved by the same weight of an acid were capable of uniting with the same weights of oxygen. Further, it was known that several metals and other elements formed more than one compound with oxygen, the proportion of the latter being different in each. Dalton showed that when elements united with each other in two different proportions, these proportions were related to each other in a very simple way. Thus, he showed that a given weight of carbon united with a certain proportion of oxygen to form carbonic oxide, and with just twice as much to form carbonic acid; also that in olefiant gas and in marsh-gas the relation of the proportion of hydrogen for a given weight of carbon was as one

is to two. Other examples were also known to him, notably in the case of compounds of oxygen and nitrogen, which showed similar simple relations. This discovery of Dalton's was what has been subsequently known as the *law of multiple proportions*, and, to explain it, Dalton reverted to the atomic hypothesis, which assumed that matter consists of atoms of different weights, those of the same element being all of the same weight.

Dalton regarded carbonic oxide as a compound of 1 atom of carbon and 1 of oxygen, and carbonic acid as a compound of 1 atom of carbon and 2 of oxygen; olefiant gas as a compound of 1 atom of carbon and 1 of hydrogen, and marsh-gas as a compound of 1 atom of carbon and 2 of hydrogen. He further assigned atomic weights or relative weights of the atoms, based upon the results of his own experiments, to each of the elements he had examined, assuming the atomic weight of hydrogen to be unity, as hydrogen combined with other elements in smaller proportion by weight than any other element. Although Dalton's atomic weights were far from accurate, yet his theory was sound that the observed law of multiple proportions could be satisfactorily explained by the atomic hypothesis.

Dalton further introduced a system of chemical notation, in which the atoms were represented by symbols.

Quickly following on Dalton's discoveries, was the discovery by Gay-Lussac of the simple relations of the volumes of gases which combine to form new compounds, and of the volume of the new gas produced. Thus Gay-Lussac proved that 2 volumes of hydrogen combined with 1 volume of oxygen to form 2 volumes of water vapour (all measured at the same pressure and temperature—these being of course such that the whole of the water formed was in the gaseous state); that 1 volume of hydrogen combined with 1 volume of chlorine to form 2 volumes of hydrochloric acid gas; and that similar simple relations existed in other cases. Gay-Lussac also noted that the numbers representing the atomic weights of elementary gases were simply related to the specific gravities of these gases. Indeed this follows directly from a consideration of his law of the simple relation of volumes, for, if 1 volume of hydrogen combines with 1 of chlorine to form hydrochloric acid, and if the gases combine atom for atom, which seems to be the simplest assumption, it is obvious that the weights of hydrogen and of chlorine in a given volume, at the same pressure and temperature, must be proportional to the atomic weights of these gases. In short, the two sets of numbers are identical if hydrogen be assumed as unity for both atomic weights and specific gravities. But further, it is also manifest that the specific gravity of the resulting gas must bear a simple relation to the specific gravities of its component gases.

Up to this period, although attempts had been made, notably by Dalton and Berzelius, to affix atomic weights to the elements, it had not been possible to do so with much certainty. An important step, however, towards definitely fixing the atomic weights of many elements was made by the experiments and observations of Dulong and Petit. These investigators called attention to the relation between the specific heats of the elements and their atomic weights. Generalising from their experiments on a number of the elements, Dulong and Petit concluded that what are now known as the *atomic heats* of all elements (that is their specific heats multiplied by their atomic weights) were approximately identical. This conclusion might also be stated otherwise—viz. that the capacity for heat of elementary atoms is identical. Some notable exceptions to

this generalisation were subsequently found, but the *law*, as it is called, of Dulong and Petit, is substantially correct. To take some examples, the specific heat of potassium multiplied by its atomic weight (0.166×39), gives as product 6.5. In the case of iron, the number is 6.3 (0.112×56), and of mercury 6.4 (0.0319×200). These numbers are very nearly constant, but all are not quite so close. Lothar Meyer states (*Moderne Theorien der Chemie*, 4th ed. p. 93) that although most atomic heats lie between 6.1 and 6.5, some are as low as 5.2 and others as high as 6.9. The fact that the atomic weights used by Dulong and Petit were different from those now commonly adopted, does not alter the general conclusions to be drawn from their observations. The constant number representing the atomic heat was, of course, different from that given above. It has not been possible to determine directly the atomic heats of all the elements, but the atomic heats of a good many have been estimated by indirect means from the molecular heats (that is molecular weights \times specific heats) of their compounds, for it has been found to be at least approximately true that the molecular heat of a compound substance is equal to the sum of the atomic heats of the atoms which it contains. In other words, the product of molecular weight \times specific heat, divided by the number of atoms in the molecule, gives a constant number.

The variations in atomic heats of various elements are, it will be noticed, considerable, but still it is sufficiently clear that an atomic heat determination is a most valuable assistance in fixing which of two or three numbers, each of which would sufficiently express the chemical relations of an element, should be adopted to represent its atomic weight. Other considerations have led in some cases to the fixing of a certain atomic weight for an element, but with the exception of what is known as Avogadro's Law, these need not be particularised here. Avogadro's Law is of the first importance, although its bearing was not recognised until many years after its promulgation, which precedes historically that of the law of Dulong and Petit.

Avogadro distinguished between elementary atoms, or the smallest indivisible particles of an element, and molecules, or the smallest portion of a substance, possessing all the properties of the substance. His molecules are hence groups of 2 or more atoms, each group being capable of a separate existence. Avogadro's Law is based upon some considerations of the physical properties of gases, which he held received their simplest explanation by the assumption that a given volume of any gas, whether elementary or compound, contains the same number of molecules as the same volume of any other gas when measured at the same pressure and temperature. This law is in complete accord with the dynamical theory of gases. See article GAS.

If now Avogadro's Law be true, the relative densities of gases must represent their relative molecular weights whether the gases be elementary or compound. Hence we are led to suppose that the molecules of some elementary gases, as of compound gases, consist of 2 or more atoms. Thus 2 volumes of hydrogen unite with 1 of oxygen to form 2 volumes of water vapour. Now, if 2 volumes of hydrogen contain twice as many molecules as 1 volume of oxygen, and the resultant 2 volumes of water vapour contain as many molecules as the original 2 volumes of hydrogen, it is obvious that each molecule of oxygen must be split into 2, and that the molecule of oxygen must consist of at least 2 atoms. Again, 1 volume of hydrogen unites with 1 volume of

Name.	Symbol.	New Atomic Weight.	Old Atomic Weight
Ruthenium	Ru	101.5	52
Samarium	Sa	150	
Scandium	Sc	44	
Selenium	Se	79	39.5
Silicon	Si	28.3	14
Silver (<i>Argentum</i>)	Ag	108	108
Sodium (<i>Natrium</i>)	Na	23	23
Strontium	Sr	87.5	43.8
Sulphur	S	32	16
Tantalum	Ta	182	182
Tellurium	Te	125	64
Thallium	Tl	204	204
Thorium	Th	232	57.8
Tin (<i>Stannum</i>)	Sn	118	59
Titanium	Ti	48	25
Tungsten (<i>Wolfram</i>)	W	183.6	92
Uranium	U	240	60
Vanadium	V	51	51.3
Ytterbium	Yb	173	
Yttrium	Y	89	30.8
Zinc	Zn	65	32.5
Zirconium	Zr	90	44.8

It has been stated in the foregoing that 1 atom of oxygen is generally regarded as combining with 2 of hydrogen to form water, and that 1 atom of chlorine combines with 1 of hydrogen to form hydrochloric acid. These are not the only variations in the number of hydrogen atoms which unite with 1 atom of another element to form a compound. Thus in ammonia we have 1 atom of nitrogen united with 3 of hydrogen; in marsh-gas, 1 of carbon united with 4 of hydrogen. Similarly, in many metallic chlorides the number of atoms of chlorine for 1 of metal varies, as for instance, in KCl , $CaCl_2$, $BiCl_3$, $SnCl_4$, &c. Again, the oxides corresponding to these chlorides are respectively K_2O , CaO , Bi_2O_3 , SnO_2 , &c.; while we know other compounds in which 1 atom of potassium exists in combination with 1 of bromine or iodine; 1 atom of calcium with 1 of sulphur or 2 of fluorine; 1 atom of antimony with 3 of hydrogen; or 2 of antimony with 3 of sulphur, and so forth. From these examples it will be clear that the atoms of the elements possess different *exchange values* in replacing one another in chemical compounds. This exchange value of an element is called its *valency*. 1 atom of chlorine combines with 1 of hydrogen or 1 of potassium, and these three elements are said to be *monovalent*. Calcium, oxygen, and sulphur are *divalent*; nitrogen (in ammonia at least), antimony, and bismuth, *trivalent*; carbon and tin,

tetravalent, &c. Some elements appear to have more than 1 valency, as for instance, phosphorus, which forms 2 chlorine compounds, PCl_3 and PCl_5 . Much controversy has taken place as to fixing the valency of such elements, some chemists contending that valency is invariable, and that where we find in some compounds an apparent valency less than the highest known, it is to be explained by supposing a part of the combining power to remain unsatisfied. It seems simplest to assume that the valency of an element may differ in different sets of compounds. The amount of importance attached to the valency of an element, and to the question as to whether or not the valency of an element is variable, is not now so great as it was formerly.

What is known as the *equivalent* of an element is that proportion of an element which is capable of taking the place of 1 atom of a monovalent element. Thus, 39 parts of potassium combine with 35.4 of chlorine to form potassium chloride. The equivalent quantity of calcium is not 40 parts (for that quantity of calcium combines with 35.4×2 parts of chlorine) but $\frac{40}{2} = 20$ parts. 20 is therefore the equivalent weight of calcium. Faraday has shown that those quantities of various elements are chemically equivalent which are separated from various electrolytes by the passage through them of the same quantity of electricity. See ELECTRICITY, GALVANISM.

When the elements are arranged in progressive order of their atomic weights, a certain regularity of succession of chemically analogous elements is observed. Attention was drawn to this by Newlands, and the matter was more fully developed by Lothar Meyer and especially by Mendeleef, who formulated the *Periodic Law* which states that the properties of an element are a function of its atomic weight. The regularity of the recurrence of the cycles or periods is so striking that the appearance of gaps in the list led to the prediction not only of the existence of numerous undiscovered elements, but of the probable properties these elements would be found to possess when discovered. These predictions have been very fully verified in the case of two or three recently discovered elements, notably gallium and germanium.

A list of the elements arranged according to the periodic system is given below :

	V.				VI.		VIII.	
Series	II 1							
1	Li 7	Be 9	B 11	C 12	N 14	O 16	F 19	
	Na 23	Mg 24	Al 27			S 32	Cl 35.4	
3	K 39	Ca 40	Sc 44	Ti 48		Cr 52	Mn 55	Fe 56; Co 58.6; Ni 58.6
				Ge 72.3	As 75	Se 79	Br 80	
5	Rb 85		Y 89	Zr 90	Nb 94	Mo 96		Ru 103.5; Rh 104; Pd 106
	Ag 108	Cd 112	In 113.4	Sn 118	Sb 120	Te 125	I 126.5	
7		Ba 137	La 138	Ce 140	Di 142		Sa 150	
8					Er 166			
9			Yb 173		Ta 182	W 183.6		Os 191; Ir 192.5; Pt 194.4
10	Ac 196.5	Pr 200	Tl 204	Pb 206.4	Bi 208			
11				Th 232		U 240		

In this table each horizontal line forms a period or cycle of the elements, and the various groups arranged in columns contain elements which ex-

hibit chemical analogies and similarities which are often very striking. The elements placed at the left of the columns possess greater resemblances to

each other than to those placed at the right, and *vice versa*. Those elements included under Group VIII. are exceptional. In each series where they occur we find a set of three elements which Mendeleëff calls *transition elements*, as they occur between the end of one and the beginning of the next *long period* or term of two series. Numerous gaps still exist in the table, indicating the places which, doubtless, elements which are still to be discovered will hereafter occupy.

A marked periodicity is noticed in the *atomic volumes* of the elements (that is, in the quotients of the specific gravities of the solids divided by their atomic weights) in each of Mendeleëff's series. This subject, however, cannot be pursued here, as its discussion would lead too far. For further information concerning it and the periodic law generally, the reader is referred to some of the larger modern text-books of chemistry. See also the article CHEMISTRY in this work.

Atomic Volumes. See ATOMIC THEORY.

Atomic Weights. See ATOMIC THEORY.

Atonement. Sin violates the ground of union which the personal creature has by nature with the holy God. The act of sin is one of separation; the act begets the state of sin, the state confirms and repeats the act. The doctrine of the atonement treats of the mediation necessary for restoring the union between God and man, which has been lost by sin. The atonement, therefore, must ever be the fundamental doctrine in every religion of sinful creatures. In the Christian religion, it manifestly occupies this central position; for the Christian doctrine of the atonement is but the explanation of its great historic fact, the embodiment in one person of the divine and human natures in perfect agreement. In the person of Christ, God and man are atoned or made at one: he is their Atonement.

So fundamental is the doctrine of the atonement in the Christian religion, that all churches may be said to be orthodox on this point. The Church of Rome, the Greek Church, the various Protestant churches all agree in resting the inner's hope of salvation on the mediatorial work or atonement of Jesus Christ. Nevertheless, from the very beginning of speculative Christian theology, there have been within the several churches various ways of conceiving and explaining the nature and mode of operation of this mediatorial work. What follows is a brief sketch of the historical development of these speculations.

Christianity differs from heathenism in the clear perception which it has of the antagonism sin has introduced between God and man. Heathenism but vaguely conceives of this variance, and consequently has but an ill-defined notion of the atonement required. The abject subjection of man to nature prevents his rising into that sphere of conscious freedom which makes sin sinful, and demands an atonement with one who is Lord both of nature and man.

In Judaism, man stands above nature, in conscious relation to a personal God, whose written law exhibits the requirements of his relationship with man—requirements which are never met, and which only make him fearfully conscious of the ever-widening breach between himself and his God. Thus the law awakened the sense of guilt, and the desire for an atonement; a desire it could never satisfy. The never-ceasing demands of these ever-unfulfilled requirements were constantly acknowledged by its whole sacrificial *cultus*, which symbolically expressed the hidden ground of Jewish hope, and prophetically pointed to its future manifestation. The Holy Scriptures in the Old Testament exhibit the making of an atonement by

vicarious sacrifice, but the idea of the suffering and vicarious Messiah, declared in the writings of the prophets, and not entirely hidden from the more thoughtful and devout contemporaries of Jesus, was one which was foreign to the Messianic faith of the great body of the people.

In the New Testament, Christ is exhibited as one sent from God for the salvation of the world; and as the condition, on the part of man, of his obtaining this salvation, we read of the requirement of repentance, faith, and reformation; whilst, on the part of God, as conditioning and mediating his forgiveness of sins, we have exhibited the life of Christ upon earth, but more especially his death, as a ransom for our sins, by which we are redeemed from the bondage of sin, and obtain forgiveness, and eternal life and peace with God. Christ is therefore the Mediator between God and man, having made peace through the blood of his cross; the propitiation for our sins; and our high-priest who offers himself a sacrifice to reconcile us with God. Moreover, we are also taught that God has in Christ reconciled the world with himself.

In accordance with this full and explicit teaching of Holy Scripture, we find that the sufferings and death of Christ were ever regarded as of primary and essential importance in his work of redemption; but notwithstanding this, we look in vain throughout the early centuries of the Christian Church for anything like a systematic development of the doctrine of the atonement. The germs of the doctrine existed, but without any logical connection or clearness. The early church fathers dwell with a sort of inspired devotion upon those facts of the gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they seldom attempt to show *how* these results connect themselves with the sufferings and death of Christ; neither do they show in what manner the atonement has objectively been made, nor how it is brought to the experience of its individual subjects. Throughout the whole earlier age of the church down to the time of Anselm, the belief was generally prevalent that Christ was offered by God, as a ransom for his people, to Satan, who held them by the power of conquest; this was specially emphasised by Origen and Irenæus, but a view similar to that of Anselm was also maintained by many, though with vagueness and inconsistency. Baur maintains that the former mode of considering the death of Christ was transplanted from the gnostics to the church by simply converting the person of the demigurge into that of the devil. Gregory of Nyssa explained that the devil consented to receive Jesus as a ransom, because he regarded him as more than an equivalent for all those under his power; but that, notwithstanding his subtlety, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not recognise him as the Son of God, and consequently was himself deceived. But having consented to receive him as a ransom for mankind, he was righteously deprived of his dominion over man, whilst he could not retain Jesus when he discovered him to be the Holy One of God. St Augustine modified the doctrine essentially by pointing out that the devil, who had overstepped his power, was conquered in the struggle. He had overstepped his power in this, that he thought he could treat the sinless Jesus as a slave, like the other sons of Adam, which last, in fact, belonged to him as prisoners. Now he lost his right to the latter so far as they belong to Christ.

The idea of a penalty endured on the part of

God gained the predominance after its advocacy by Athanasius. He argued that as God had threatened to punish transgressors with death, he could but execute his threat. But then it was not becoming the character of God to follow his purpose in the creation of man to be frustrated by an imposition practised upon him by the devil. The only expedient, therefore, which remained for man's deliverance from death was the incarnation and sacrifice of the Logos in his stead, by which the justice and veracity of God would be maintained, man delivered, the law fulfilled, and the power of the devil broken.

But the doctrine of the atonement was not presented in its final form until the acute and subtle genius of Anselm reduced the more or less confused conceptions of the early fathers to strict dogmatic definitions, and for the first time adjusted the apparent contradiction between divine love on the one hand, and divine justice and holiness on the other. To his clear intellect is due that statement of the doctrine of vicarious *satisfaction*, which, under various modifications, has ever since continued to be held as the orthodox doctrine of the church. The infinite guilt which man had contracted, by the dishonour of his sin against the infinitely great God, could be atoned for by no mere creature; only the God-man Christ Jesus could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life, therefore, was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honour of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren. In this form of the doctrine we are taught the necessity of an active vicarious satisfaction; but Anselm nowhere teaches the passive satisfaction, he nowhere says that Christ endured the punishment of men. Nor do we find in his writings the development of the subjective side of the doctrine—namely, how the satisfaction rendered to God mediates the atonement in the experience of the believer. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which he atoned; and it needed to be greater, for the payment of the debt due to God gave men no claim to the favour of God. Abelard attached principal importance to the *moral* aspect of the doctrine, and declared the love of Christ the redeeming principle, inasmuch as it calls forth love on our part. Thomas Aquinas and his followers maintained Augustine's opinion of the infinite value of the blood of Christ rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient.

Protestants and Roman Catholics alike accept the doctrine of the atonement as given in Anselm's *Satisfaction* theory, in ascribing to the sufferings or merits of Christ an infinite objective value, but the former give the preference to that aspect of this theory presented by Thomas Aquinas; the latter, to that of Duns Scotus. The Protestant theologians, however, extended the idea of vicarious suffering, so as to make it include the divine curse, an opinion against which Bellarmine protested as 'a new unheard-of heresy,' while, on the other hand, they insisted on the active obedience of Christ, together with the passive, referring the former to the complete obedience which he yielded to the law.

Both opinions were intimately connected with the Protestant dogma of justification. With the Roman Catholic theologians, satisfaction is made by the death of Jesus only for guilt contracted before baptism, and only the eternal punishment due to mortal sins committed after baptism is remitted; so that Christians have themselves to make satisfaction for venial sins by temporal punishments. They also asserted that the merits of Christ were supererogatory, while Protestants thought they were equivalent to the penalties to be inflicted upon men. And lastly, according to Roman Catholics, Christ by his sufferings obtained merit for himself. Among the Protestants themselves, the Reformed Church approximated more nearly to the Scotist *acceptilatio* than did the Lutherans. The following is an outline of the Lutheran doctrine, as laid down in the *Concordienformel*: It is alone by faith we can receive the blessings presented to us in the gospel by the Holy Ghost. Faith justifies, because it appropriates the merit of Christ. Therefore, the righteousness which is imputed to the believer, simply by the grace of God, is the obedience, the suffering, and the resurrection of Christ, by which he has satisfied the claims of the law, and atoned for our sins. For as Christ is not merely man, but God and man in one person, he was, as Lord of the law, no more subject to it than he was subject to suffering and death. For this reason, his twofold obedience—that which he rendered, on the one hand, by his suffering and death; and, on the other, by his righteous fulfilment of the law on our behalf—is imputed to us, and God acquits us of our sins, and regards us as just, in view of his complete obedience in what he did and suffered. This obedience embraces the entire existence of Christ upon earth, and is so complete that it fully covers the disobedience of men, so that it is not reckoned against them for condemnation.

According to Calvin, if it is asked how Christ has reconciled us with God, and purchased a righteousness which made him favourable to us, it may be answered generally, that he accomplished this by the whole course of his obedience. But although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to his death. Calvin attached great importance to the particular mode of his death—any other mode of death would not have rendered the same satisfaction to God. He, however, says little or nothing about Christ's fulfilling the law for us, but dwells upon his delivering us from its curse. He does not, therefore, exhibit his active obedience separated, as an essential part of his satisfaction for sin, from his passive obedience. The importance attached to the obedience of his life arises from its natural and necessary connection with his suffering and death. And the great importance attached to his death is drawn rather from the view of its subjective necessity, than from the idea of the divine righteousness—namely, that without such a death there would have been no sufficient ground for the subjective realisation of deliverance from sin and guilt. Calvin's view differs from that of the Lutheran *Concordienformel* in that he does not regard the relationship of God to man so much through the negative notion of a Redeemer from guilt and punishment, but looks upon Christ as the highest Mediator, through whom the nature of God is communicated to man.

Modern Calvinism represents the atonement as that satisfaction for sin which was rendered to God, in his public character as moral governor of the world, by the perfect obedience unto death of our Lord Jesus Christ. The nature of this satisfaction was a moral, not a pecuniary satisfaction.

It preserves to the moral government of God its authority, whilst its tendency is to secure the forgiveness of sin. The value of the sufferings of Christ consists in their tendency to uphold the divine moral government unimpaired, whilst pardon is extended to those who have violated it. There was a moral necessity for Christ's sufferings and death--obstacles to the bestowment of pardon had to be removed--the influence of the Holy Spirit had to be secured. The whole contents of Christ's earthly existence, embracing both his active and passive obedience, must be regarded as contributing to the atonement which he made. As to the 'extent' of the atonement, there is a broad distinction to be made between the *sufficiency* of the atonement and its *efficiency*. It may be true that Jehovah did not intend to exercise that influence of the Holy Spirit upon all, which is necessary to secure the salvation of any one; but as the atonement was to become the basis of moral government, it was necessary that it should be one of infinite worth, and so in itself adequate to the salvation of all. The Universalists (q.v.) hold both the sufficiency and ultimate efficiency of this great event.

The foregoing represents the modified view of the doctrine as advocated by Dr Payne, and as held, in all essential respects, by such men as Pye Smith, Wardlaw, and many others. This view in its earlier form, and as found in the writings of Owen and Edwards, maintains that the atonement was made only for the elect; and that its necessity with respect to them arose out of the eternal justice of God, which required that every individual should receive his due desert; and, consequently, that the sufferings of Christ were the endurance of punishment equivalent in amount of suffering, if not identical in nature--as Owen maintains--with that to which the elect were exposed; and, moreover, that the meritorious obedience of Christ in fulfilling the law, imputes a righteousness to those for whom the atonement secures salvation, which gives them a claim to the reward of righteousness.

The teaching of Socinus is a re-statement of the *Moral Influence* theory first distinctly taught by Abelard. It represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for him to forgive sin without a satisfaction, as imposing finite limitations upon the divine Being; disapproves the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and objects that sin and punishment are of so personal a nature as not to allow of their being transferred. The doctrine it sought to establish was that man is reconciled to God by repentance and reformation. Only from an act of man changing his disposition, and not from an act of God changing his relation to man, follows his reconciliation with God. God is in himself ever the same towards man: reconciled from all eternity; man alone has to assume a new relation; as soon as he does this, he is immediately reconciled; by this act of his will, he is at one with God. In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience. The sufferings of Christ were necessary in order that he might become our example, and be better fitted to render us holy, that we might have a pledge and guarantee of the divine forgiveness; and as conditioning his resurrection and ascension to glory.

The Arminians endeavoured to take an intermediate position between the theory of Socinus and the satisfaction theory of Anselm. They asserted that the design of Christ was to render a sacrificial

oblation in behalf of all men indiscriminately, by which 'sufficient grace' is meritoriously secured for each, and their sins rendered remissible upon condition of faith. They maintained that the doctrine that Christ satisfies in our behalf the preceptive demands of the law by his active obedience, as well as the penal demands by his passive obedience, leads to Antinomianism.

Grotius drew a subtle distinction between *satisfactio* and *solutio*, and taught that God, by inflicting death on Christ, had given in an arbitrary way an example of punishment. His atonement theory is known as the *Governmental* theory. According to it God's justice is not vindictory, but may be referred to a general governmental rectitude based on a benevolent regard for the well-being of the subjects of his moral government. Law is a product of the divine will, and therefore relaxable. God's sovereign prerogative includes the right of pardon. God so conditions the pardon of human sinners, by selecting such an example of suffering that man may not think he can sin with impunity. Christ's sufferings, then, were not punishment, but an example of a determination to punish hereafter. They were not to satisfy divine justice, but to impress the mind of the moral universe with a sin-detering motive. This view is substantially the same as that held by the younger Edwards in America. After Grotius, Limborch emphasised the idea of a sacrifice, as set forth in the Old Testament, which the theologians previous to Anselm had generally adopted. This theory was introduced into the Arminian works on theology, and approved by the Socinians of the next period. The Quakers admitted that redemption has once been made by the death of Christ, but connected with it the idea of a second redemption realised internally. This second reconciliation they regarded as the essential redeeming principle.

According to what is often called the *Mystical* theory, the reconciliation effected by Christ was brought about by the mysterious union of God and man, accomplished by the incarnation, rather than by his sacrificial death. This view was not confined to the Platonising fathers or the disciples of Scotus Erigena, but was held by Osiander and Schwenkfeld at the Reformation, and by the school of Schleiermacher, the most spiritual among modern theologians. The last connected the doctrine of the vicarious sufferings and perfect obedience of Christ with his sinlessness and the doctrine of his priestly office, but separated the substitution and the satisfaction so as to represent Christ's sufferings as only vicarious, but not as making satisfaction; and his obedience as making satisfaction, but not as vicarious. The redeeming and atoning principle is not the single fact that Christ died, but a vital union with him. By means of this we appropriate to ourselves Christ's righteousness (his obedience unto death); this appropriation, however, is not to be confounded with the mere external theory of vicarious satisfaction. Christ's passive obedience is merely the crown of his active obedience.

The following are the statements of three modern representative English theologians: (1) J. J. Tayler, as representing the view of modern Unitarianism, which has followed naturally from the 'moral influence' theory of Socinus and earlier of Abelard; (2) Dr J. McLeod Campbell, whose 'sympathy theory' was a spiritual outgrowth from Calvinism; (3) F. D. Maurice, the representative of the modern 'Broad Church' School, which approximates to the 'moral influence' theory in its attitude to the atonement question.

(1) Dr Tayler says: 'There is *one* mediator between God and men, the man Christ Jesus. This can only refer to unrivalled pre-eminence, not to

exclusive function. For all higher minds do, in fact, mediate between their less gifted fellow-creatures and the great realities of the invisible world. This 'one' is a human mediator, 'the man Christ Jesus'—not a being from another sphere, an angel or a God but a brother from the bosom of our own human family. 'He gave himself a ransom for all' who embrace his offers and will hearken to his voice. He brings from God a general summons to repent; and with that he conveys, through faith, a spiritual power to shake off the bondage of sin, and put on the freedom of a new heart and a new life. He is a deliverer from the power of sin and the fear of death. This is the end of His mediation. This is the redemption of which he paid the price. His death, cheerfully met in the inevitable sequence of faithful duty, was only one among many links in the chain of instrumentalities by which that deliverance was effected. It was a proof, such as could be given in no other way, of trust in God and immortality, of fidelity to duty, and of love for mankind. In those who earnestly contemplated it, and saw all that it implied, it awoke a tender response of gratitude and confidence, which softened the obdurate heart, and opened it to serious impressions and the quickening influences of a religious spirit.

(2) Dr John McLeod Campbell says: The work of the Son of God who came to do and did the will of his Father must, in view of the deliverance which he wrought, be regarded as twofold: first, as dealing with man on behalf of God, and second, as dealing with God on behalf of man. In dealing with man on behalf of God, Christ revealed to us the Father in his relation to a sinful world, showed us what our sins were to God, vindicated in the world the Father's name, and witnessed to the excellency of that will against which we were rebelling. In thus revealing the will of the Father towards sinful men, he necessarily became a man of sorrow and suffering, but these arose naturally out of what he was, and the relation in which he stood to those for whom he suffered; and to the holiness and love of his very nature must we refer their awful intensity and immeasurable amount. He suffered what he suffered just through seeing sin and sinners with God's eyes, and feeling in reference to them with God's heart. By what he suffered, he condemned sin, and revealed the wrath of God against it. His holiness and love taking the form of suffering, compose the very essence and adequacy of his sacrifice for sin.

Again, in dealing with God on behalf of man, the oneness of mind with the Father which towards man took the form of condemnation of sin, became in his dealing with the Father in relation to us a perfect confession of our sins, which was a perfect Amen in humanity to the judgment of God on the sin of man. Such an Amen was due in the truth of all things, due on our behalf, though we could not render it, due from him as in our nature and our true brother. He who was the truth, could not be in humanity and not utter it. This confession of our sins by him who, as the Son of God and the son of man in one person, could perfectly realise the evil of man's alienation—this Amen from the depths of the humanity of Christ to the divine condemnation of sin, has all the elements of a perfect repentance in humanity, for all the sin of man: all except the personal consciousness of sin; and by that perfect response or Amen to the mind of God, in relation to sin, is the wrath of God rightly met, and that is awarded to divine justice which is its due, and could alone satisfy it. This confession of the world's sin by the Head and Representative of humanity, was followed up by his intercession as a part of the full response of the mind of the Son

to the mind of the Father. 'He bore the sins of many, and made intercession for the transgressors.'

(3) F. D. Maurice professed to hold a purely biblical theology, as opposed to the theologies of consciousness, which he repudiated. His doctrine of the atonement is the answer which the Bible gives to the demands of a sin-smitten conscience. A sinner requires, and is content to be told on the authority of Scripture, that the Son of God has taken away sin. This message from God is the gospel for all men. The sinner wants to be assured that God has spoken, that he has declared himself the Reconciler, and desires to be shown how and in whom he has accomplished that work on his behalf.

To this question How and in whom the work of reconciliation has been accomplished Maurice replied as follows: The will of God is set forth in the Bible to be a will which is good to all, and the ground of all that is right, true, just, and gracious; the Bible also sets forth the Son of God as being one in will, purpose, and substance with the Father, and shows that his whole life on earth was an exhibition of, and submission to his Father's will. The Son of God was Lord of men, the Root and Head of humanity, and the source of all light and righteousness in man. Being thus one with God and one with man, he brought the will of God into our nature, and fulfilled it in our nature perfectly. In the fulfilment of this will in our nature, as its head, he shared its sufferings, enduring that wrath or punishment which proceeded from Holy Love; thus realising, on the one hand, the sins of the world, and on the other, the consuming fury of the holiness of the love of God, with an anguish which only a perfectly pure and holy Being, who is also a perfectly sympathising and gracious Being, can feel. The man Christ Jesus was for this reason the object of his Father's continual complacency—a complacency fully drawn out by the death of the cross which so perfectly brought out to view the uttermost power of self-sacrifice which lay hidden in the divine love, and consequently he exhibited humanity, in its head, atoned for, reconciled.

The reader is referred for further and fuller information on this subject to the following works: Baur, *Die Christliche Lehre von der Versöhnung* (1838), and *Vorlesungen über die Christliche Dogmengeschichte* (3 vols. 1865-67); the *Dogmengeschichte* of Neander, of Gieseler, and of Hagenbach; Calvin's *Institutes*; the relevant works of Edwards, of Owen, of Archbishop Magee, of Dale, and of Professor Crawford; Campbell (John McLeod), *Nature of the Atonement*; Thomson's *Bampton Lecture* (1853); H. N. Oxenham's *Catholic Doctrine of the Atonement* (2d ed. 1869); Tayler (J. J.), *Christian Aspects of Faith and Duty*; Maurice, *Theological Essays*; the great work of Ritschl, *Die Christliche Lehre von der Rechtfertigung und Versöhnung* (3 vols. 2d ed. 1870-74); and Dr G. Jamieson's *Discussions on the Atonement. Is it Vicarious?* (1887). See also the articles ELECTION, PREDESTINATION, SACRIFICE, &c. in this work.

Atony (Gr. *a*, 'not,' and *teino*, 'I stretch'), in Medicine, slackness, debility of the whole body, or of any muscular organ.

Atrato, a river of Colombia, interesting because it has repeatedly been made to bear a part in schemes for a ship-canal across the Isthmus of Panama. Rising on the Western Cordillera at an altitude of 10,560 feet above sea-level, it runs 305 miles northward through low swampy country, and falls by several mouths, interrupted by bars, into the Gulf of Darien. It is navigable by steamers for fully 250 miles, being 750 to 1000 feet wide, and 8 to 70 feet deep. A route, surveyed by the United States government in 1871, proposed to connect the Atrato and the Jurador, flowing into the Pacific, by a canal 48 miles long. At the Paris International

Congress (1879) for deciding the best route for the interoceanic canal, that route was, with various others, discussed and rejected in favour of De Lesseps' line from Limon to Panama. Gold-dust is found in and about the Atrato.

Atrauli (*Atrauli*), a town of British India, in the North-west Provinces, 16 miles N.E. of Aligarh. Founded about the 12th century, it is well built, with wide streets, a good bazaar, and an abundant supply of water. Pop. (1871) 15,052; (1881) 16,000.

Atrek, a river of Persia, rising in Khorasan, among the Hazar Masjid Mountains, and thence flowing nearly 350 miles westward to the Caspian Sea, from Slutt downwards along the boundary with the Russian empire. Its width at the mouth is usually only 30 feet, but in the spring tides it overflows its banks to a width of over two miles.

Atræus, son of Pelops, grandson of Tantalus, and elder brother of Thyestes. He was married first to Cleola, who bore him Pleisthenes, then to Elope, who had been wife of his son Pleisthenes, and who bore him Agamemnon and Menelaus, and lastly to Pelopia, daughter of his brother Thyestes. Having to flee for the murder of his half brother Chrysippus, he came along with Thyestes to Mycenæ, and ultimately became its king. Here his wife Elope was seduced by Thyestes, who, when banished for this outrage, sent Pleisthenes to slay Atræus, but the latter slew the youth instead, not knowing him at the time to be his own son. In revenge he killed the two sons of Thyestes, and placed their flesh before the father at a banquet ostentatiously made to celebrate the reconciliation. The unhappy father fled in horror, and the vengeance of heaven, in the shape of famine, fell on Atræus for his abominable atrocity. Advised by the oracle to call back Thyestes, he went to search for him, and at the court of King Theseus married his third wife Pelopia, whom he believed to be a daughter of Theseus, but who was really a daughter of Thyestes, and at the time with child by him. This child, Egisthus, afterwards slew Atræus when commissioned by the latter to slay his own father Thyestes. The tragic fate of the house of Pelops gave materials to the great tragic poets of Greece, whom Milton in his *Il Penseroso* speaks of as 'presenting Thebes or Pelops' line, or the tale of Troy divine.

Atri, or **ADRIA**. See **ADRIA**.

Atriplex. See **CHENOPODIACEÆ** and **ORACHE**.

Atrium, in Roman Architecture, was the hall which formed the chief part of a Roman house; into it one entered from the vestibule by the main door. It was lighted from the roof, which sloped towards an opening in the centre (the *compluvium*), through which the rain-water flowed into a kind of cistern situated on the floor (the *impluvium*). On both sides, passages led to the several chambers, and behind it was the roofless *caraculum*. In early Rome, the family gods and the nuptial couch stood in the atrium, which was used as the common public apartment, where the mistress and her maids sat spinning; but in later times it was reserved as a general waiting-room for visitors and clients. In ecclesiastical architecture, the atrium was an open court before a church, where penitents and others stood to solicit the prayers of the faithful.

Atropa. See **BELLADONNA**.

Atrophy (Gr. *a*, 'not,' and *trophê*, 'nourishment'), an alteration of the vital processes in a living organism, either animal or vegetable, resulting in a diminution in size and functional activity of the whole organism (general atrophy), or of certain of its organs or tissues. It may be a natural process, as in atrophy of the thymus gland

during childhood, or in general atrophy of old age; but is much more commonly the result of disease or injury. It may be caused (1) by a deficient supply of nourishment, as by starvation and diseases affecting digestion, or by injury of or pressure on the arteries supplying a part with blood, as when beggars produce atrophy of their muscles by tight bandaging of their limbs; (2) by excessive waste of tissue, as in fevers; (3) by diminished functional activity, as in atrophy of paralysed limbs from disease; and (4) by certain poisons, such as iodine, lead. Compare **HYPER-TROPHY**, **NUTRITION**.

Atropia, or **ATROPINE**, $C_{17}H_{23}NO_3$, is an alkaloid existing in all parts of the deadly nightshade (*Atropa belladonna*). The seeds of the thorn-apple (*Datura stramonium*) also contain an alkaloid, Daturine, which for long was believed to be identical with atropia. Recent researches seem to indicate that it is, however, only isomeric, and that it is only half as poisonous as atropia. It may be prepared from the juice of belladonna by heating it to 194 F. (90 C.), filtering, and after addition of potash, shaking with chloroform. The crude alkaloid obtained after evaporation of the chloroform is purified by crystallisation from hot alcohol. The crystals occur in colourless silky needles, united in tufts. It is very poisonous, that of a grain causing dryness of the throat; but it is nevertheless used internally or by injection in cases of whooping-cough and ptialism. It is also used as an antidote in cases of opium poisoning. A solution of sulphate of atropia in water dropped into the eye is now generally preferred to belladonna lotions or ointments for eye diseases. It produces dilatation of the pupil and paralysis of the accommodation, which do not completely pass away for some days; and also a sedative and enervative effect in many inflamed conditions. A solution of about four grains to the ounce is most often employed; but a single drop of a very much weaker solution affects the pupil.

Atropos, one of the Fates (q.v.).

Atta'ché (Fr.), one attached to or connected with another, as a part of his suite or attendants. The term is specifically applied to young diplomats on the staff of an ambassador.

Attachment is an English legal term, signifying the form of process by the authority of which the person or the goods of a debtor may be seized in satisfaction. As a proceeding against the person, it is a species of criminal process, and has the force of much that will be found under **ARREST** (q.v.). In form, it is a writ addressed to the sheriff, commanding him to attach the person against whom it is issued, and have him before the court to answer for some act or default amounting to contempt of court. Thus, in Hawkins's Pleas of the Crown, such contempts are thus classed: (1) Disobedience to the Queen's writs; (2) Contempts in the face of a court; (3) Contemptuous words or writings concerning a court; (4) Refusing to comply with the rules and awards of a court; and (5) Forgery of writs, or any other deceit tending to impose on a court. Parties are also liable to the process of attachment as for a contempt of court where, in an arbitration (see **ARBITRATION**) the award having been made a rule of court, the parties refuse to obey the same. In Chancery, there may be attachment of the person for judicial default or other offence to the court, as, for example, where a defendant fails to put in a proper defence to the plaintiff's statement of claim. A witness who fails to attend when duly summoned is in such event considered to have committed a contempt of court, and to be liable to be punished for such contempt by attachment.

No attachment may be issued without the leave of the court, to be applied for on notice to the party against whom it issues.

The proceeding by attachment of debts or goods in hands of a third party resembles in some respects the Scots diligence or process of arrestment (see ARRESTMENT). The best illustration we can give of it, in this sense, is that relating to the power of a judgment creditor to recover under his judgment. Under the rules of court now in force, a judgment creditor may, on an *ex parte* application, obtain a garnishee order to attach debts owing to the debtor from any third person within the jurisdiction; and the third person or Garnishee (q.v.) may be ordered to attend and show cause why he should not pay his debt to the judgment creditor. This latter proceeding is the equivalent of the action of furthcoming in Scotland. The ordinary diligence of arrestment in execution against the movable estate of a debtor, as practised in Scotland, is in England not usually called attachment, but simply execution of judgment debt.

Foreign Attachment originated in the custom whereby the citizens of London, Bristol, Exeter, and Lancaster, when suing foreigners, i.e. debtors outside the city—were entitled before judgment to attach their goods or debts in the hands of a garnishee, and so compel them to appear and plead. It is still competent in the Mayor's Court of London, though not in the High Court of Justice. It resembles the Scottish procedure of arrestment in security and *ad fundandam jurisdictionem*. See ARRESTMENT.

In the United States, attachment may be defined as the taking into the custody of the law the person or property of one who is already before the court, or of one whom it is sought to bring before the court; also a writ for this purpose. To some extent it is of the nature of a criminal process. In some states, attachments are distinguished as foreign and domestic—the former issued against a non-resident having property within the jurisdiction of the state, the latter against a resident in the state; jurisdiction over the person or property being necessary for an attachment. An attachment issued under a state law which has not been adopted by congress, or by a rule of court, cannot be sustained in a United States court. Money due to a seaman for wages is not attachable in the hands of a purser, the purser being a distributing agent of the government, and in no sense the debtor of the seaman.

Attainder (through Fr. from Lat. *attingere*, 'to touch upon'; supposed erroneously to be through Fr. from Lat. *tingere*, 'to dye,' 'taint'), in English law, is the legal consequence of sentence of death or outlawry, in respect of treason or felony. The erroneous explanation of the word warped its original meaning, and hence the idea of the stain came to be considered as essential. It was followed by *forfeiture of estate and corruption of blood*; and generally it imported extinction of civil rights and capacities. Thus, an attainted person cannot sue in a court of justice; he loses all power over his property; and he is by his attainder rendered incapable of performing any of the duties, or enjoying any of the privileges of a free citizen. It was only in cases of treason that there was an absolute forfeiture of real estate. In cases of murder and other felony (and formerly the majority of crimes were felonies), the forfeiture of lands to the crown lasted only for a year and day; and even this limited forfeiture was in 1814 confined to the case of murder. But then in such cases, by the doctrine of corruption of blood, the heir of the traitor or felon was incapacitated from succeeding, and the land reverted to the lord or superior, who was frequently the crown. Legis-

lation was passed at the time of the Jacobite rebellions to confine the effect of attainder to the person actually convicted, but it was not till 1833 that it became possible in England to trace descent through an attainted person. The forfeiture applied to honours and dignities as well as land; but where land or honours were entailed, it was held that the remainder-men or substitutes were unaffected. In Scotland, the whole law on this subject has been widely different. Forfeiture of movable estate (or escheat) occurred in every case of capital sentence, i.e. almost every felony in former times, and also in every case of outlawry. This must be distinguished from the penalty of escheat of movables which was by statute imposed for such crimes as deforcement, perjury, and bigamy. Some doubt exists as to how far *civil death* followed in the case of a condemned felon, as in the case of an outlaw. But in Scotland, except in cases of treason, the forfeiture never extended to the fee of real estate. There was a liferent escheat in favour of the superior, but even the outlaw retained a right of disposing of land. Nor was there in Scotland, except in the case of treason, anything resembling corruption of blood. Upon the other hand, the Scottish law of treason prior to the Union was in some respects more stringent than that of England. It forfeited all interests in an entailed estate or dignity. The laws of the two countries were assimilated by statute, which introduced to Scotland (though with less practical effect) the doctrine of corruption of blood. Those who desire to trace the effect of such laws on the political history of the time should examine Lord Hardwicke's work on the law of forfeiture. Formerly, an attainted person could not give evidence in a court of justice; but that disability in England has been removed by the 6 and 7 Viet. chap. 85, and in Scotland by the 15 and 16 Viet. chap. 27.

But in 1870 the law on this subject was revised and made more consistent with reason by the Act 33 and 34 Viet. chap. 23. No conviction for treason or felony now causes any attainder or corruption of blood, or forfeiture or escheat. When a convicted person is sentenced to any punishment more severe than twelve months' hard labour, he is deprived of any public office or employment, and of any public pension, or of the right of voting at elections. He may be condemned to pay the costs or expenses incurred in procuring his conviction, and in cases of felony to make payment of a sum not exceeding £100, as compensation for any loss of property caused by such felony. He cannot sue for any property, debt, or damage. While he is a convict undergoing any imprisonment, the sovereign may appoint paid administrators to take charge of his property at the convict's expense, to deal with the property, and pay debts, and do what is needful. They may also pay out of his property satisfaction for any loss or injury suffered by third parties in consequence of his criminal or fraudulent acts, though no proof of such criminal or fraudulent acts need have been made in any court of law. They may also make allowances to support the convict's family. If the crown does not appoint an administrator, justices of the peace may appoint interim curators, if satisfied that it will benefit the convict or his family, or the due administration of his property and affairs. Should any person interfere with the convict's property, the Attorney-general or next of kin may call them to account. When the sentence expires, then the administrators or curators are to account to him for his property. If during the sentence any property be acquired by the convict, it is not to vest in the administrators, but is to be his own.

Attainder was sometimes inflicted after death; thus, four of the regicides—Cromwell, Ireton;

Bradshawe, and Pride—were attainted posthumously.

In the United States, attainder, as it existed in England prior to the Act 33 and 34 Vict., is absolutely unknown. The Constitution of the United States forbids the enactment of any bill of attainder by congress or any of the states. Prior to the adoption of the Constitution, it was held that state laws banishing the persons and confiscating the property of individuals named for their treason, were valid; but an act of congress disbarring lawyers unless they would take an oath denying past acts of treason, has been held to be unconstitutional as a bill of attainder.

BILL OF ATTAINDER, and **BILL OF PAINS AND PENALTIES**, are bills in parliament, introduced for punishing enacting the attainder and punishment of persons who have criminally offended against the state and public peace. Such a legislative proceeding was had recourse to generally in times of turbulence, when, either from the peculiar nature of the offence, or in consequence of difficulties in the application of the ordinary laws, it became necessary to resort to parliament. During the reign of Henry VIII., persons of the highest rank were frequently brought to the scaffold by such means; among whom may be mentioned the Earl of Surrey, the Earl of Essex, and others, who suffered for denying the king's supremacy. The inquiry under a bill of attainder was entirely in the hands of parliament, who might dispense at their pleasure with such rules and forms of law as appeared inconvenient or unsuitable to the purpose in hand. Accordingly, the bills were often passed up *vide* which add the

efficient, or even admissible in a court of law; and there are even instances where parties were attainted, and punished, without there being any evidence against them at all, and even without their being heard in their defence. Under the Stuarts, this extraordinary mode of proceeding in parliament was seldom had recourse to in England, and it has been still more rarely used since the accession of the House of Hanover. It has been much debated whether the attainder of Strdford (q.v.) in 1641 was constitutional. The Jacobite movement in Scotland, after the union with that country, was productive of several instances of parliamentary attainder, which, however, resulted merely in the forfeiture of the estates of the attainted parties, and in many such cases the attainder has since been removed by statute. The last instance of bill of attainder for treason was that of Lord Edward Fitzgerald, one of the leaders of the Irish rebellion of 1798. In regard to bills of pains and penalties, perhaps the two most remarkable instances are those of Bishop Atterbury, in 1722 (see **ATTERBURY**), and of Queen Caroline, wife of George IV., in 1820.

The proceedings of parliament in passing bills of attainder, and of pains and penalties, do not vary from those adopted in regard to other bills. But the parties who are subjected to these proceedings are admitted to defend themselves by counsel and witnesses before both Houses. In the best of times, this summary power of parliament to punish criminals by statute should be regarded with jealousy; but whenever a fitting occasion arises for its exercise, it is undoubtedly the highest form of parliamentary judicature. In impeachments, the Commons are but accusers and advocates, while the Lords alone are judges of the crime. On the other hand, in passing bills of attainder the Commons commit themselves by no accusation, nor are their powers directed against the offender; but they are judges of equal jurisdiction and with the same responsibilities as the Lords; and the accused can only be condemned by the unanimous judg-

ment of the Crown, the Lords, and the Commons. —May's *Proceedings of Parliament*, 3d edition, p. 509. See also **FORFEITURE**, **IMPEACHMENT**, **TREASON**.

Attalea, a genus of palms, chiefly natives of the tropical parts of America. See **PALM**.

Attar. See **OTTO OF ROSES**.

Attempt is a technical term in the criminal law of England and of Scotland, and is applied to any act done with the intention of committing a crime, and which can fairly be described as one of a series of acts which would constitute the crime, if uninterrupted and successful. It does not matter that the accused has decided not to proceed further with the commission of the crime. According to the rule of English law, every attempt to commit an offence is a misdemeanour, except that in a few cases—e.g. murder—the attempt is a felony. In Scotland, the law of attempt is unsatisfactory. Thus, attempts to steal or to commit fraud, and some other attempts, are, contrary to legal principle, held not to be indictable offences. In 1887 it was proposed to make all attempts indictable. It was also proposed, what has been the law of England since 1851, that under an indictment charging an offence the accused may be convicted of an attempt.

Atterbom, **PETER DANIEL AMADEUS**, Swedish poet, was born at Asbo in East Gotland in 1790, and in 1805 proceeded from the gymnasium of Linköping to the university of Upsala, where he was appointed professor of Logic (1828) and of Esthetics (1835). He died 21st July 1855. Atterbom was the leader of the Swedish Romanticists, called 'Fosforisterna' from their organ *Phosphorus* (1810-14), of which he was editor, as also of the *Poetisk Kalender* (1812-22). His works, which present a curious blending of the hyper-romantic with German philosophy, fill thirteen volumes (1854-70). The best are *Ljucksolighets Ö* ('Island of Happiness'), and a cycle of romances, *Blommarna* ('The Flowers').

Atterbury, **FRANCIS**, Bishop of Rochester, was born 6th March 1662, at Milton, near Newport-Pagnell, Buckinghamshire, and educated at Westminster School, whence in 1680 he passed to Christ Church, Oxford. In 1687 he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, master of University College. Taking orders about the same time, he won such reputation as a preacher, that he was appointed lecturer of St Bride's (1691), a royal chaplain, and minister to Bridewell Hospital. In 1698 a sensation was created in the learned world by the Hon. Charles Boyle's *Examination of Dr Bentley's Dissertation on the Epistles of Phalaris* (q.v.). This clever, but shallow performance was really composed by Atterbury, who had been the young nobleman's tutor at Christ Church. In 1700 he distinguished himself in a controversy with Dr Wake regarding the powers and privileges of Convocation. His zealous and caustic defence of the ecclesiastical against the civil authority, procured him the thanks of the lower House of Convocation, the archdeaconry of Totnes, a canonry of Exeter, and the degree of D.D. In 1704 he was promoted to the deanery of Carlisle; in 1710 was chosen prolocutor of Convocation; in 1712 became Dean of Christ Church; and in 1713 was made Bishop of Rochester and Dean of Westminster. To Atterbury is ascribed, with great likelihood, Dr Sacheverel's famous defence (1710) before the Lords; and he was author of the scarcely less famous *Representation of the State of Religion* (1711). He may well have aspired to the primacy; but the death of Queen Anne extinguished his hopes in

that direction. His known character and Jacobite leanings made him no favourite with George I. In 1715 he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the Peers against the government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restoration of the Stuarts at length brought down upon him the charge of treason, and in 1722 he was committed to the Tower. A bill of pains and penalties was brought into the House of Commons, and passed in the Lords by 83 to 43. Atterbury, who had defended himself with great ability, was deprived of all his ecclesiastical offices, and for ever banished the kingdom. No doubt he was implicated in treasonable plots, but the legal proof on which this sentence was founded cannot be deemed sufficient to justify its severity. In 1723 he quitted England, and after a short stay at Brussels, settled in Paris, where he died, 15th February 1732. He was laid in a nameless grave in Westminster Abbey. His works, which fill ten volumes, comprise sermons, and letters to Pope, Swift, Bolingbroke, and others of his friends the brightest luminaries of that Augustan age. See Macaulay's article, and Williams' *Memoirs and Correspondence of Atterbury* (2 vols. 1869).

Attestation, in Conveyancing, is the verification of the execution of deeds and wills by witnesses; hence the clause at the end of these instruments which immediately precedes the signatures of the witnesses, is called the attestation clause (see DEED, WILL, WITNESS). In the Scotch practice, the corresponding clause is called the Testing-clause (q.v.).

Attic, a term in Architecture, employed to designate a low story rising above the cornice that terminates the main elevation of a building. Such a structure was usually of the *Attic order*, having square columns or pilasters instead of pillars. In domestic architecture, the word is usually applied to sky-lighted rooms in the roof.

Attica, one of the political divisions or states of Hellas or ancient Greece, of which Athens was the capital. Its area was about 640 sq. m., rather smaller than that of Lanarkshire. The territory is of triangular shape, having its north-east and south-west sides washed by the sea, while on the north it is connected with the mainland. In ancient times it was bounded on the W. by Megaris and the Saronic Gulf; on the S., which ran out into the 'marble steep' of Sunium, by the Ægean Sea; on the E. by the Ægean Sea; and on the N. by Boeotia, from which it was separated by a lofty range of hills, the most famous part of which was formerly called Citharon. Ancient Attica was thus walled in from the rest of Greece; whilst within its own limits rose Mount Parnes (4634 feet), Pentelicon (3641), Hymettus (3368), Ægaleus (1535), Lycabettus (911), and the Athenian Acropolis (513). The largest plains extend in the neighbourhood of Athens and Eleusis. The two principal rivers were the Cephissus and Ilissus, which, if they exhibited the same features in ancient times as they do now, must have been mere mountain-torrents, dry in summer. The unfruitfulness of the soil, and the scarcity of water, compelled the inhabitants occasionally to send out colonies. As early, however, as the time of Solon, Attica was well cultivated, and produced wine and corn. Mount Hymettus was celebrated for its bees and honey, and metals were found in the range of Laurium. Figs, olives, and grapes are still cultivated. Goats and sheep find suitable pasturage; but the country does not now produce much grain. According to ancient tradition, the Autochthons of Attica were first civilised under Cecrops, who is said

to have come thither from Sais, at the mouth of the Nile in Egypt, about 1550 B.C., and to have introduced the culture of olives, and of several species of grain, as also to have implanted milder manners, and taught the worship of the gods. He is stated to have divided the country into twelve communities or states. This, however, was not the only division known in early Attica. A still older division into *phylai*, or tribes, existed, as also a minute subdivision into *demoi*, or townships. By Theseus Athens was united with the eleven other states of Attica under one government, of which Athens was made the seat. After this union of the several states, the whole of Attica shared in the fortunes of Athens (q.v.), and, under Vespasian, became a Roman province. On the division of the Roman empire, Attica naturally fell into the hands of the Greek emperors. In 396 A.D. it was captured by Alaric, king of the Goths. What may have been its population in ancient times it is impossible to determine precisely. Clinton estimates it at upwards of half a million, but this is probably exaggerated. To-day Attica and Boeotia together form a monarchy or government in the kingdom of Greece, with an area of 2472 sq. m., and a pop. (1879) of 185,264.

Atticus, TITUS POMPONIUS, was born in Rome 109 B.C., or three years before the birth of Cicero, along with whom and the younger Marius he received a good education. In 85 B.C. he withdrew to Athens, glad to be separated from the political distractions of his native land. After 65 B.C., when Sulla induced him to return to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in politics. Yet he was by no means without influence on public affairs, as he lived on terms of familiar intercourse with several leading statesmen, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious speculations. His mode of life was frugal. In 32 B.C. he was informed that a disorder under which he was labouring was mortal, and died after five days of voluntary starvation. An Epicurean in philosophy, he was intimately acquainted with both Greek and Roman literature, and his taste was so good that Cicero used to send him his works for the benefit of his revision. None of his own writings have been preserved, but we have a series of 396 epistles addressed to him by Cicero, ranging from the years 68 to 44 B.C. His life by Cornelius Nepos is unfortunately a panegyric rather than a biography.

Attila (Ger. *Etzel*; Hungarian, *Ethel*), the 'Scourge of God,' was born about 406, the son of Mundzak, king of the Huns, and in 434 succeeded his uncle Rhuas as chief of countless hordes scattered over the north of Asia and Europe. His brother Bleda shared with him the supremacy over the Huns, but was put to death about 444 by Attila, whom the Huns regarded with superstitious reverence, and Christendom with superstitious dread. Men believed that he was armed with the sword of the Scythian war-god, which must win dominion over the whole world. It is not certain when the name 'Scourge of God' was first applied to Attila; but he is said to have received it from a hermit in Gaul. The whole race of Huns was regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* ('the threatening scourges of sinners'). The Vandals, Ostrogoths, Gepidae, and many of the Franks, fought under Attila's banner, and in a short time his dominion extended over the people of Germany

and Scythia—from the Rhine to the frontiers of China. In 447, after an unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The Emperor Theodosius collected an army to oppose the barbarians' inrush, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedonia, and Greece were overrun; seventy flourishing cities were desolated; and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror; after treacherously attempting to murder him. In 451 Attila turned his course westward, and invaded Gaul, but here was boldly confronted by Aëtius, leader of the Romans, and Theodoric, king of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Plain—waited to meet the enemy. The army of the West, under Aëtius and Theodoric, encountered the forces of the Huns near the site now occupied by the city of Châlons-sur-Marne. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle, and after a terrible contest, the ranks of the Romans and their allies, the Visigoths, were broken. Attila now regarded victory as certain, when the Gothic prince, Thorismund, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and Attila with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the bloodiest battle ever fought in Europe; for it is stated by contemporaries, that not less than 252,000 slain were left on the field—a field, says tradition, yet haunted by their spectres. Attila, retiring within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pyre, resolved to perish in the flames rather than yield; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. In the following year Attila had recovered his strength, and made an incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, the Apennines, and the lagoons of the Adriatic, where they founded the city of Venice. The Roman emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I., who visited the dread barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans, and old chroniclers relate that the apostles Peter and Paul appeared in Attila's camp, and changed his purpose. By 453, however, he seems to have forgotten their visit, for he made preparations for another invasion of Italy; but he died on the night of his marriage with the beautiful Hildico, or Hilda, perhaps by her hand, more probably of a hemorrhage. His death spread consternation through the host of the Huns. They cut themselves with knives, and shaved their heads, and then prepared to celebrate the funeral rites of their king. It is said that his body was placed in three coffins—the first of gold, the second of silver, and the third of iron; that the caparisons of his horses, with his arms and ornaments, were buried with him; and that the captives employed to make his grave were all put to death,

that none might betray the resting-place of Attila. Jornandes describes him as having the Mongolian characteristics—low stature, a large head, with small, brilliant, deep-seated eyes, and broad shoulders. See Gibbon's *Decline and Fall*, and Thierry's *Histoire d'Attila* (4th ed. 1874).

Attleborough, a market-town of great antiquity in Norfolk, 16 miles SW. of Norwich by rail. It had a college of the Holy Cross (1387); and its cruciform parish church contains some interesting monuments. Pop. of parish (1881) 2244.

Attleborough, a post-village in Massachusetts, U.S., 31 miles SW. of Boston by rail. Pop., with North Attleborough, (1880) 11,111.

Attock, a town and fort of the Punjab, on the left or east bank of the Indus. Attock stands below the fort, a parallelogram of 800 yards by 400, established by the Emperor Akbar in 1581, to defend the passage of the river, but it is no longer a position of strength. The great railway-bridge across the Indus here was opened in 1883. It has five arches 130 feet high, and renders continuous the railway connection between Calcutta and Peshawur (1600 miles). The situation of Attock is important, whether in a commercial or in a military view. It is at the head of the steam-boat navigation of the Indus, being 940 miles from its mouth; while, about 2 miles above it, the Cabul River, the only considerable affluent of the Indus from the west, is practicable for vessels of 40 or 50 tons for a distance of 50 miles. The valley, again, of this last-mentioned stream, presenting, as it does, the best approach to the east and south from Central Asia, has been the route of nearly all but the maritime invaders of India from the days of Alexander the Great downwards. *Pasila*, where the Macedonians crossed the Indus, has been identified with Attock. Pop. 4000.

Attorney ('one appointed,' from the old verb *attorn*, 'turn, assign, or appoint'), a term of English law, used in a general sense to describe any person authorised to act on behalf of another, as, for example, the holder of a power or letter of attorney authorising him to sell property or do some other act on behalf of the grantor. 'Attorney-at-law' was formerly the proper style of those members of the legal profession who represented litigants in the courts of common law, and retained counsel on their behalf; but since the Judicature Act, 1873, it has been superseded by the designation of Solicitor (q.v.).

In the United States, the term attorney-at-law is used for one standing in the place of another in matters of law, including in itself the special offices designated in English and Scotch law by the terms advocate, attorney, barrister, counsellor-at-law, lawyer, proctor, and solicitor, although all these terms, except barrister, are sometimes used as applicable to the attorney-at-law in the performance of the duties pertaining to his office.

The attorney-at-law is not a governmental officer, but is an officer of the court, responsible to the court under whose immediate supervision he is, for the faithful performance of his duties. He has property in his office, and although he may be punished summarily for official misconduct occurring in open court, he cannot be removed from his office without special cause and without having an opportunity to be heard by himself or counsel.

Empowered to stand in the place of his client, all matters of law, he performs all acts necessary for the successful prosecution or defence of his suit, not only in the office preparation of the cause, but also in arguing the same in open court.

Each state prescribes by statute the qualifications of its own attorneys, but generally a pre-

liminary examination as to educational qualifications is required, followed by a clerkship of from two to four years in the office of a regular practising attorney of known ability, whose duty it is to register the name as a student-at-law in the office of the prothonotary of the county; after this comes an examination as to legal attainments by a board of examiners appointed by the court, or graduation as Bachelor of Laws at a law college or university. A good moral character is always demanded.

Any person who has been admitted to the highest court of a state is eligible for admission to the district and circuit courts of the United States for that state, but to be admitted to the Supreme Court of the United States, it is necessary that an attorney shall have for three years been a practitioner in the Supreme Court of the state to which he belongs, and that his private and professional character shall be fair. His oath of office requires him to support the constitutions of his state and of the United States, and to behave himself with all fidelity to the court and to the client: hence citizenship of the United States and of the state are requisite.

The efforts of women to be admitted as attorneys-at-law in the state courts since 1870, and the refusal of the Supreme Court of the United States to admit women as attorneys, resulted in the enactment by congress, in 1879, of the following statute: 'Any woman who shall have been a member of the bar of the highest court of any state or territory, or of the Supreme Court of the district of Columbia for the space of three years, and shall have maintained a good standing before such court, and who shall be a person of good moral character, shall on motion and the production of such record, be admitted to practise before the Supreme Court of the United States.' Under this act, several women who have complied with its provisions have been admitted to practise as attorneys-at-law in the Supreme Court of the United States, but some of the states do not yet admit women to practise as attorneys. In 1887 about one hundred women, married or single, had been admitted as attorneys in the United States.

An attorney's warrant of attorney must be commensurate with the work to be done. The fiduciary relation between attorney and client cannot be delegated. In case of his death, service of papers cannot be made upon his law partner or executor, neither can he withdraw from the case without leave of the court. If removed by his client, which in most cases must be done by leave of court, he has a lien upon the papers in the case for his fee.

An attorney-at-law is required to act with the utmost diligence and fidelity to his client, but his undertaking is not that he possesses perfect legal knowledge or the highest degree of skill in relation to the business he undertakes, but that he possesses the ordinary legal knowledge and skill common to members of the profession, and that in the discharge of his duties he will exercise ordinary and reasonable diligence, care, and prudence. He is therefore liable to his client for negligence before damage is sustained. An attorney is trustee for his client for money collected, and after demand has been made upon him, he may be sued without notice. His authority to compromise a suit must be given him by his client. His confidential communications with his client are privileged, and are not to be revealed even on the witness stand.

Attorney-general, the title by which, in England and Ireland, the first ministerial law officer of the crown is known. The attorney-general is appointed by letters-patent. His office, powers, and duties correspond in many respects to those

that belong to the Lord Advocate (q.v.) in Scotland, though the powers of the latter functionary are more extensive and less clearly defined. Originally, the attorney-general was simply the king's attorney, and stood to the sovereign in the same relation as any other attorney does to his employer. The term 'general' was afterwards conferred to distinguish him from attorneys appointed to represent the interests of the crown in particular courts, such as the Court of Wards; or from the master of the crown office, who is called the 'Coroner and Attorney for the Queen.' The early history of this office is involved in obscurity. Though there can be no doubt that the crown must always have been represented by an attorney in the courts of justice, the first record of the designation *Attornatus Regis* belongs to the reign of Edward I. (1272-1307). Up to a period comparatively recent, the king's serjeant was the chief executive officer of the crown in criminal proceedings, and this circumstance gave rise to various questions of difficulty as to the right to precedence of these officers respectively. These questions were set at rest in 1811, by a special warrant by the then Prince Regent, afterwards George IV., by which it was declared that both the attorney and solicitor general should have place and audience before all other members of the English bar. A similar question arose in a Scotch appeal in the House of Lords in 1835, between the Attorney-general and Lord Advocate, which was also decided in favour of the former. The following may be enumerated as the principal duties of the attorney-general: 1st, To exhibit informations and conduct prosecutions for crimes which have a tendency to disturb the peace of the state or endanger the constitution (see PLEA); 2d, To advise the government on legal questions; 3d, To conduct prosecutions and suits relating to the revenue; 4th, To file informations in the Exchequer for personal wrongs committed on any of the possessions of the crown; 5th, To protect charitable endowments in the sovereign's name, as *pateris patrie*, and, generally, to appear in all legal proceedings in which the interests of the crown are at stake. The attorney and solicitor general are two of the Commissioners of Patents (q.v.) *ex officio*. The powers of the solicitor-general are co-ordinate with those of the attorney-general, and in the absence of the latter, or during a vacancy, the former may perform his functions in all their extent. Both usually have seats in the House of Commons, and their tenure of office concerns with that of the government of which they are members. They were formerly paid by fees, but now by fixed salary.

The duchies of Lancaster and Cornwall, and the county palatine of Durham, have separate attorney-generals.

Under the United States government, the attorney-general is one of the seven officials who constitute the president's cabinet. These officers are appointed by the president, confirmed by the senate, and removable at pleasure. The attorney-general is the head of the Department of Justice, and his duties are to give advice and opinions to the president, or any of the heads of the executive departments on questions of law arising in their respective departments. He argues suits in the United States courts when considered necessary, provides legal service on behalf of the government in the prosecution or defence of suits at law, examines titles to lands purchased by the United States for public use, and exercises a general superintendence over the minor officials of the United States courts. His salary is \$8000 per annum. Nearly all of the states of the Union have attorney-generals, who are in some instances appointed by the governors, in others elected by the

people. Their duties under the state governments correspond essentially with those of the United States attorney-general under the general government.

Attraction. The mutual action between any two bodies is termed stress. When the stress tends to separate the bodies, or to prevent their mutual approach, it is termed a pressure or repulsion. When the stress is such that the bodies tend to approach each other, it is termed a tension or attraction. The words repulsion and attraction are used when the bodies are considered to influence each other directly; but when the action is considered to be propagated through an intervening medium, the terms pressure and tension are used. Newton believed that no action could be propagated except through a medium. Electric and magnetic phenomena have been very completely accounted for by the action of a medium (see **ELECTRICITY**). Attempts to explain gravitation by such action have not been so successful. Though they account sufficiently for the observed phenomena, they all postulate the existence of an unlimited supply of energy. Sir W. Thomson has shown that Cohesion (q.v.) can be explained by the Newtonian law of gravitational attraction. See **GRAVITATION**, **CAPILLARITY**, **CHEMISTRY**, **MAGNETISM**.

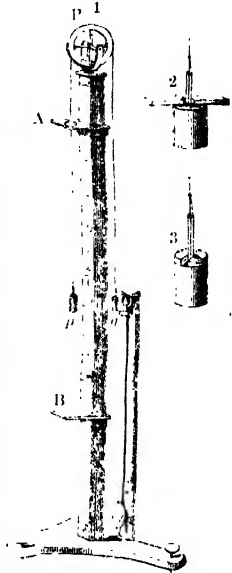
Attrek. See **ATREK**.

Attribute. In Logic, is used to denote the opposite of substance. The latter is considered to be self-existent, while the former can only be conceived as possessing a dependent existence. Attributes are commonly said to belong to substances. Thus, wisdom, holiness, goodness, and truth are termed attributes of God, who is Himself regarded as the substance in which they inhere; in the same way, whiteness is called an attribute of snow.

Atwood. THOMAS, musician, was born in London in 1765, and during 1783-87 studied at Naples under Cinque and Latilla, at Vienna under Mozart. With some other appointments, he held that of organist of St Paul's from 1796 till his death, 24th March 1838. His works, more tuneful than nervous, include two coronation anthems, songs, glees, and pianoforte pieces.

Atwood's Machine, an instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity. It was invented by George Atwood or Attwood, a mathematician of some eminence, who was born in 1745, educated at Cambridge, became fellow and tutor of Trinity College in that university, published a few treatises on Mechanics and Engineering, and died in 1807. It is found that a body falling freely, passes through 16 feet in the first second, 64 feet in the first two seconds, 144 feet in the first three seconds, and so on. Now, as these spaces are so large, we should require a machine of impracticable size to illustrate the relations just mentioned. The object of Atwood's machine is to reduce the scale on which gravity acts without in any way altering the nature of its actions. The machine consists essentially of a pulley, P (see fig. 1), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, p and q , at its extremities. The pulley rests on a square wooden pillar, graduated on one side in feet and inches, which can be placed in a vertical position by the levelling-screws of the sole on which it stands. Two stages, A and B, slide along the pillar, and can be fixed at any part of it by means of fixing screws. One of these stages, A, has a circular hole cut into it, so as to allow the cylinder, p , to pass freely through it; the other is unbroken, and intercepts

the passage of the weight. A series of smaller weights, partly bar-shaped, partly circular, may be placed on the cylinders in the way represented in figs. 2 and 3. A pendulum usually accompanies the machine, to beat seconds of time. The weights of the cylinders, p and q , being equal, they have no tendency to rise or fall. When a bar is placed



Atwood's Machine.

on p , the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that p and q are each $7\frac{1}{2}$ ounces, and that the bar is 1 ounce. the force acting on the system—leaving the friction and inertia of the pulley out of account—would be $\frac{1}{15}$ of gravity, or the whole would move only 1 foot in the first second, instead of 16. If the bar be left free to fall, its weight would bring its own mass through 16 feet the first second; but when placed on p , this force is exerted not only on the mass of the bar, but on that of p and q , which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must, in consequence, move it 16 times more slowly. By a proper adjustment of weights, the rate of motion may be made as small as we please. The various formulæ (see **KINEMATICS**) connecting time, speed, and space fallen through under gravity can be experimentally verified by such an instrument. For example, if the weight of p be increased by a small amount, and the space it falls through in one second be noted, it is found that after two seconds it has fallen through four times that space, and so on. Thus, the space fallen through from rest is proportional to the square of the time occupied in falling.

Aubagne, a town in the French department of Bouches-du-Rhône, on the river Huveaune, 10½ miles E. of Marseilles by rail. The *Albania* of the Celtic Albici, it has a ruined castle, and a monument (1828) to the Abbe Barthélemy, and it trades in fruit and wine. Pop. 5000.

Aube, a department in the north-east of France, occupying the southern part of the old province of Champagne and a small portion of Burgundy, bounded by Marne, Haute-Marne, Yonne, and Seine-et-Marne. The eastern part belongs to the basin of the river Aube; the western to that of the Seine. Area, 2310 sq. m. Pop. (1886) 257,374. The climate is moist, but healthy. A great portion of the area is arable land. The north-east is chiefly pastoral; but the south-east is far more fertile, rich in meadow-land and forest, and producing grain, hemp, rape, hay, timber, and wine. The minerals are iron, building-stone, marble, chalk, marl, and potters' clay. Many persons are employed in the iron-industry, in cotton-spinning and weaving, in silk-spinning, and in the production of cloth, porcelain, faience, glass, paper, soap, and rape-sugar. There is an active commerce in wine, timber, and country produce by the railways, with which the department is covered, and of which its capital,

Troyes, is the centre. The river Aube rises near Mount Saule, on the plateau of Langres, and flows 140 miles north-westward by La Ferté, Bar, and Acriis, to the Seine.

Aubenas, a town of S.E. France, in the department of Ardèche, 50 miles N.N.E. of Alais by rail. It is built on a height rising 688 feet above the river Ardèche, and has a fine old castle. The inhabitants are employed in coal and iron mining, tanning, paper-making, and silk-culture; and the town is a great silk emporium. Pop. (1881) 5356.

Auber, DANIEL FRANÇOIS ESPRIT, a composer of operas, was born at Caen in Normandy, January 29, 1784. His father, who was a printseller in Paris, sent him to London to acquire a knowledge of business. But his irresistible passion for music obtained the upper hand, and after a short stay he returned to Paris. Among his earliest compositions may be noticed his very successful *concertos* for the violoncello, the concerto for the violin, and the comic opera, *Julie*. Aspiring to greater things, he now devoted himself to a deeper study of music under Cherubini, and wrote a mass for four voices. His next work, the opera *Le Séjour Militaire* (1813), was coldly received; but the death of his father compelled him to be dependent on his profession. In 1819 appeared *Le Taisant et les Billets-doux*, which was also unsuccessful; but in *La Bergère Chétivaine* (1820) he laid the foundation of his subsequent fame. In all these early essays he displayed a style of his own; and though afterwards he was profoundly influenced by Rossini, his work has always a distinctive character. In 1822 he became associated with Scribe, who provided him subsequently with librettos admirably adapted to his music. Most of Auber's operas correspond to Scribe's comedies of Parisian life. Instead of deep natural feelings, they reflect elegant and brilliant French manners and conversation; the music is melodious, graceful, entertaining, but for the most part deficient in depth of thought and feeling. By far the most important and successful of his operas is *La Muette de Portici*, usually known as *Masaniello* (1828); of the lighter works, *Fra Diavolo* (1829) is the best known. Of his forty operas the next most notable are *Le Domino Noir* (1837); *Les Diamants de la Couronne* (1841), *Angèle* (1847), *La Fiancée du Roi de Garbe* (1861), and *Rèves d'Amour* (1869). He composed a work for the London Exhibition of 1862. He was a member of the Institute, director of the Conservatory of Music, and commander of the Legion of Honour. He died at Paris, May 13, 1871.

Aubervilliers, a place in the Seine department, about 5 miles N. of Paris, with a fort included within the system of fortification of the capital. Its industries are iron-founding, manufactures of caoutchouc, paper, varnished leather, glass, and chemicals. Pop. (1881) 19,437.

Aubigné, MERLE D'. See D'AUBIGNE.

Aubrey, JOHN, antiquary and folklorist, was born at Easton Percy, near Chippenham, in Wiltshire, 12th March 1626, and was educated at Malmesbury, under Latimer, the assessor, at Blundford grammar-school, and at Trinity College, Oxford. He entered the Middle Temple in 1646, but was never called to the bar; in 1672 he succeeded to estates in Wiltshire, Herefordshire, and Wales, but was forced through lawsuits to part with the last of them in 1679, and with his books in 1677. His last years were passed in 'danger of arrests,' with Hobbes, Ashmole, and other protectors, till in June 1697 he died at Oxford, on his way back from London to Draycott. His quaint, credulous *Miscellanies* (1696) was the only work printed in his lifetime; but he left a large mass of materials. Of these, his Wiltshire and Sarrey collections have

in part been published; his 'Minutes of Lives' (Hobbes, Milton, Bacon, &c.), given to Antony à Wood, first appeared in *Letters by Eminent Persons* (1813); and his *Remains of Gentilism and Judaism* was issued by the Folklore Society in 1880. See an article by Professor Masson in the *British Quarterly* (1856).

Auburn, the name of several places in the United States. (1) The most important of these is in the state of New York, 173 miles W. by N. of Albany. The outlet of Owasco Lake flows through the town, furnishing a water-power which is employed in mills of various kinds, and in manufactures of agricultural machinery on a large scale, wool, cotton, silk, carpets, iron, boots, shoes, flour, and paper. The number of convicts in the state prison, founded here in 1816, usually exceeds 1000; they are employed in the manufacture of boots, shoes, and iron hollow ware. Since 1823 it has been conducted on the 'silent' or 'Auburn' system. There are also a state asylum and a state armoury. Pop. (1870) 17,225; (1880) 21,924; (1890) 25,858. — (2) A town of Maine, on the west bank of the Androscoggin River, by which it is separated from Lewiston, 35 miles N. of Portland by rail. It has manufactures of cotton, furniture, and boots and shoes. Pop. (1876) 6169; (1880) 9555; (1890) 11,250.

Aubusson, a town in the French department of Creuse, 47 miles E.N.E. of Limoges, and 15 miles S.S.E. of Bussac d'Athin by rail. Picturesquely situated in the rocky gorge of the river Creuse, it is a well built place, and is celebrated for the weaving of carpets and tapestry, which is said to have been introduced by Arab fugitives from the battle of Tours (732). The manufacture of common cotton and woollen goods is also carried on, and there is some trade in wine and salt. Pop. 6406.

Aubusson, PIERRE D'. See D'AUBUSSON.

Auch, the capital of the French department of Gers, on the river Gers, 44 miles S. of Agen by rail. The *Augusta Auscorum* of the Romans, it is built on a hill, whose summit is crowned by the cathedral (1489-1662), rich in stained glass and carved woodwork. A flight of 200 steps leads up to it from the river. The chief articles of trade are woollen and cotton stuffs, fruits, wine, and the brandy of Armagnac. Pop. (1881) 12,175.

Auchinia. See LAMA.

Auchinleck, an Ayrshire village, 15 miles E. of Ayr by rail. Pop. (1881) 1528. The parish contains Auchinleck House (locally called 'Place Aillock'), the seat of the Boswell family. Here, beside this mansion, Sir Alexander Boswell, son of Johnson's biographer, established in 1815 the *Auchinleck Press*, for printing MSS. and rare works, such as the Romance of Sir Tristrem, the Disputation between John Knox and the Abbot of Crossraguel, &c.

Auchterarder, a Perthshire village, 14½ miles S.W. of Perth by rail. Pop. (1881) 2666, largely employed in the woollen manufacture. The popular opposition to the presentee to the church of Auchterarder originated (1834) the struggle which ended in the secession from the Church of Scotland and the formation of the Free Church in 1843.

Auckland, the northern provincial district of New Zealand, includes fully a half of North Island, and is about 400 miles long by 200 wide at its greatest breadth. The bays of its coast-line afford safe harbourage, and its rivers serve as high ways for the produce of the interior. There are three almost natural divisions of this district: North Peninsula, East Coast, and the Waikato Country—the latter two, which had been mainly in the hands of the natives, have lately been opened up for European settlement. The land

is chiefly of two kinds—a light volcanic loam, and a stiff yellow clay. For the most part it is broken, with low ranges of hills and broad shallow valleys, covered to a great extent with dense forests. It is less suited for grazing than for agricultural purposes. Gold, copper, tin, iron, coal, and other minerals exist in Auckland, which is also very rich in timber, the most important tree being the Kauri pine. The fossil gum of ancient forests of this pine is dug up in large quantities, and exported. Much New Zealand flax is grown and manufactured. About 200 miles of railway give connection with the agricultural districts. The annual value of the exports, including wool, Kauri gum, timber, flax, and gold, averages £1,000,000; the imports are double that amount. The value of the gold exported from 1857 to 1885 was £5,35,287. The climate is pleasant and healthy, and owing to sea-breezes, the summer heat is not so great as in other parts of Australasia in the same latitude. Ferns grow in perfection, upwards of 130 species being found. Volcanic action has deeply left its mark on the surface of Auckland; there is still an active volcano near the city of Auckland; and the warm lake and geyser scenery of the region about 90 miles SE. from Auckland, below the Bay of Plenty, is considered by travellers the most remarkable in the world. The 'Hot Lake' district covers an area about 120 miles long, by 10 to 15 miles wide, and includes hot springs, cisterns of hot water, and mud volcanoes. A sanatorium for bathing purposes exists near Lake Taupo, and at Ohinemutu on Rotoma. The other lakes are Tarawera, Rotoiti, and Rotomahana. The wonderful pink and white terraces near Tarawera Lake were destroyed by a volcanic eruption in 1886. The white terrace, which had the appearance of a crystal staircase, glittering and stainless, as of ice, was produced by deposits of silica from the boiling springs; the pink terrace, its companion, was flushed with a pale rose colour, believed to have been caused by the presence of oxide of iron. Auckland was the scene of the labours of Bishops Selwyn and Patteson. The population in 1875 was 79,104; (1881) 99,451; (1891) 133,267.

Auckland, the largest city in the North Island of New Zealand, situated on a peninsula about 7 miles wide on the Hauraki Gulf. It stands on the south side of Waitemata Harbour, one of the finest harbours in New Zealand, with sufficient depth of water for the largest steamers afloat; and its splendid wharves and graving-docks offer the most complete facilities for shipping. Auckland is distant from Sydney 1315 miles; from Melbourne, 1650; and has regular steam communication with both. It possesses also a harbour on the western side of the island in Manukau, only six miles across. It is surrounded by numerous thriving villages, with several of which it is connected by railway. Auckland contains a well laid out botanical garden and two public parks, and shows numerous public buildings, government house, exchange, post-office, custom-house, banks, hotels, churches, and barracks. Most of the stores and shops are of a substantial character. It has a university college and cathedral, and the foundation stone of a Free Library and Art Gallery was laid in 1885. The temperature is singularly equable and free from extremes of heat and cold, the mean average temperature in shade is 59·6° F. The industrial establishments include boiler and glass works, saw-mills, shipbuilding, vinegar and rope works; sugar refinery, boot factory, &c. Auckland has connection with all the chief centres of New Zealand by telegraph. About 230 sailing vessels and 62 steamers are registered as belonging to the port. Pop. (1881) 16,675; but including suburban districts,

30,952; (1891) borough, 28,773; with suburbs, 51,287. The city was founded in 1840, and was named in honour of Lord Auckland, then governor-general of India. It was the capital of New Zealand up to 1865.

Auckland, WILLIAM EDEN, LORD, statesman and diplomatist, third son of Sir Robert Eden, Bart., of West Auckland, Durham, was born in 1744, educated at Eton and Oxford, and called to the bar in 1768. In 1772 he was appointed Under-secretary of State, and afterwards filled the offices of Lord of Trade, commissioner to treat with the American insurgents, chief secretary to the Irish viceroy, minister-plenipotentiary to France (concluding a commercial treaty with that country, 1786), ambassador to Spain, ambassador to Holland, and postmaster-general. In 1788 he was raised to the Irish, in 1793 to the British, peerage as Baron Auckland. He died May 28, 1814. Besides *Principles of the Penal Law* (1771), we have his *Journal and Correspondence* (4 vols. 1860-62).

His son, GEORGE EDEN, EARL OF AUCKLAND, was born in 1784, and in 1814 succeeded as Lord Auckland. A steadfast supporter of Reform, he held two or three offices, and in 1835 was appointed governor-general of India. As such, in 1838, he plunged into the unhappy Afghan war, whose successful beginning procured him the title of Earl of Auckland. Superseded in 1841, he returned to England, and died unmarried, January 1, 1849.

Auckland Islands, a group of islands about 180 miles to the south of New Zealand. The largest of them measures 30 miles by 15. It has two good harbours, and is covered with the richest vegetation. The Auckland Islands are valuable chiefly as a whaling station, but are not peopled. They were annexed by Great Britain in May 1866.

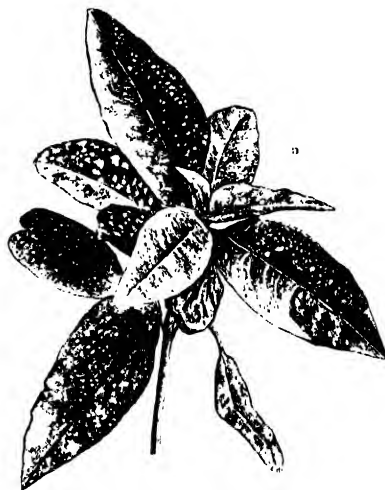
Auction (Lat. *auctio*). The character of this convenient mode of offering property for sale is correctly indicated by the name, which means an arrangement for increasing the price by exciting competition amongst purchasers. In the *Dutch Auction* of the 'Cheap Jack,' the usual mode of proceeding is reversed, the property being offered at a higher price than that which the seller is willing to accept, and gradually lowered till a purchaser is found. The *Scottish roup* differs from the ordinary auction in having a judge of roup, and in sales of land an 'upset' price. In sales for redemption of land-tax in England, the bidding is often for the smallest quantity of land to be taken for a fixed sum. 'Conditions of Sale,' or 'Articles of Roup,' as they are called in Scotland, constitute the terms on which the seller offers his property, and form an integral part of the contract between seller and purchaser. The contract is completed by the offer or bid on the part of the purchaser, and the acceptance by the seller or his representative, which is formally declared by the fall of the auctioneer's or salesman's hammer, the running of a sandglass, the burning of an inch of candle (hence the term 'sale by the candle'), or any other means which may have been specified in the conditions of sale. Mere advertisement does not make a contract. These conditions or articles ought further to narrate honestly and fully the character of the object or the nature of the right to be transferred, to regulate the manner of bidding, prescribe the order in which offerers are to be preferred, and to name a person who shall be empowered to determine disputes between bidders, and in cases of doubt to declare which is the purchaser. Before the sale commences, these conditions, which are executed on stamped paper, are read over, or otherwise intimated to intending purchasers, but it is sufficient if they are posted up in the auction room. The conditions, thus published,

cannot be controlled by any verbal declaration by the auctioneer. Even the statements in a catalogue, or particulars of an estate, cannot be varied by statements of auctioneer. It is understood that an auctioneer may puff his goods. The implied conditions, which, in addition to those thus expressed, are binding on the seller and purchaser in all auctions, are: (1) That the seller shall not attempt to raise the price by means of fictitious offers, but shall fairly expose his goods to the competition of purchasers; and (2) That the purchasers shall not combine to suppress competition. It is usual to stipulate for a deposit varying from 5 to 25 per cent. by the purchaser, either with the auctioneer or (in sales of land) with the seller's solicitor. Much doubt has arisen as to the lawfulness of biddings for the exposor, through the auctioneer or by others. The exposor may set a price below which the thing is not to be sold, which is best and most openly done by fixing an upset price, or he may expressly reserve to himself a power to offer. 'But if the sale is declared to be without reserve, or at the pleasure of the company, the plain meaning and effect of this, even in England, is held to be to bar all biddings in behalf of the seller.' 'In Scotland, the law condemns absolutely such interference.' 'It has been said, that if there be no upset price, and no agreement to sell at the pleasure of the company, the owner may bid, but that is not law, or is at least too broadly laid down.' Where an unlawful offer is made for seller, the remedy is to set aside this, and the contract holds with the last *bona-fide* offerer. Nearly all sales by order of court take place by auction, and the same course is directed by numerous statutes, as the Pawnbrokers' Act, the Summary Jurisdiction Act with regard to distresses, &c.

Auctioneer, the person who conducts an Auction (q.v.). The auctioneer is in a certain sense the agent both of seller and purchaser, and by the fall of his hammer, or by writing the purchaser's name in his book, he binds him to accept the article sold at the price indicated. The auctioneer may also, and frequently does, act as agent for absent purchasers, or for persons who have instructed him to make biddings for them during the sale. In both cases, however, the purchaser must be *bona-fide*, otherwise the auctioneer would himself become a 'puffer.' As to the circumstances in which he may bid for the seller, see AUCTION. Where the auctioneer declines or omits to disclose the seller's name, he undertakes the responsibilities of the latter to the purchasers. To the seller, again, he is responsible for ordinary skill, assiduity, and prudence. Every auctioneer pays an annual duty of £10 to government for his license, which must be renewed on the 5th July; though there are certain judicial sales which may be conducted by bailiffs without license. But the want of a license does not vitiate the sale. An additional license is required for the sale of excisable goods, but the ordinary license entitles an auctioneer to act also as appraiser. An auctioneer is generally paid by commission on proceeds after deduction of expenses, and this is due even where the owner makes a private sale after an unsuccessful exposure; for this commission the auctioneer has a lien upon the price and goods in his hands. The auctioneer is liable for negligence in the custody of goods sent to him for sale, but he is not liable for the price unless he has received it.

Aucuba, a genus of Cornaceæ (q.v.), of which the familiar, and probably the only true species is *A. japonica*, an evergreen shrub resembling a laurel, but, as seen in Europe, always with paler green leaves curiously mottled with yellow. It is dioecious, and until recently the female plant was

alone in cultivation in Europe. The male, and also the normal green-leaved forms, have now been introduced, and many varieties are now grown. The scarlet berries are therefore becoming more frequently seen as pollination becomes possible.



Aucuba japonica.

The common form has long been largely cultivated as a hardy ornamental shrub, especially in the suburbs of large towns, a situation for which it is well adapted, as it is little liable to suffer injury from smoke. It is often known as the variegated laurel, but has of course no affinity with any of the other plants popularly confused under that name.

Aude (*Atar*), a river in the south of France, rises in the Eastern Pyrenees, not far from Mont Louis; flows for some time parallel to the canal of Languedoc; and falls into the Mediterranean 6 miles ENE. of Narbonne, after a course of 130 miles.

Aude, a maritime department in the south of France. It comprises some old 'counties' which formerly constituted a portion of the province of Languedoc. Area, 2438 sq. m.; pop. (1886) 332,080. The southern part is occupied by spurs of the Pyrenees, attaining 4037 feet in the Pay de Bigarach; but the greater portion belongs to the valley of the lower Aude, and is bounded to the north by offsets of the Cevennes (4018 feet). The coast is flat, with no bays or roadsteads, but several lagoons. The climate is warm, but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast, where salt and soda are procured is extremely fertile, producing cereals, olives, fruits, and wines. Aude is rich in iron and mineral springs, but the coal-mines have been generally abandoned. Wild animals are found, and game of all sorts is plentiful, while the coast abounds in fish. The woollen and silk manufactures are of considerable value. There is likewise a considerable export of cereals and of honey. The chief town is Carcassonne (q.v.).

Audebert, JEAN BAPTISTE, a French naturalist and artist, was born in 1759 at Rochefort, and at Paris attained eminence as a miniature-painter. In 1800 he published a splendid illustrated volume on the monkeys and lemurs, the *Histoire Naturelle des Singes*, a large folio, with coloured plates remarkable alike for their truth and beauty, and in whose production he introduced great improvements in the art of colour-printing in oil. He subsequently prepared a similar work on the

humming-birds (1802), and another on the birds of paradise (1803), which were both completed and published after his death in 1800.

Audh. See OUDH.

Audiometer is a special application of the Telephone (q.v.) for measuring minute differences in the power of hearing.

Audiophone is the name of an invention (1879) by Mr Rhodes of Chicago, to assist the hearing of deaf persons in whom the auditory nerve is not entirely destroyed. The instrument is made of a thin sheet of ebonite rubber or hard vulcanite. It is about the size of a palm-leaf fan, with a handle and strings attached to bend it into a curving form, and a small clamp for fixing the string at the handles. The audiophone is pressed by the deaf person—sing it against his upper front teeth, with the convex side outwards; when so placed it communicates the vibrations caused by musical sounds or articulate speech to the teeth and bones of the skull, and thence to the organs of hearing. For different sounds, it requires to be focused to different degrees of convexity. A simple strip of fine glazed millboard has been recommended by some experimenters as a cheaper and equally serviceable audiophone; and birch-wood veneer has been used with success for the same purpose.

Audita Quere'la is a form of action which lies for a defendant to recall or prevent an execution, who has grounds to show that such execution ought not to issue against him, or on account of some matter occurring after judgment amounting to a discharge, which could not have been and cannot be taken advantage of otherwise. It is a remedial process, equitable in its nature, based upon facts, and not upon the erroneous judgment or acts of the court, in which damages may be recovered if execution was improperly issued. In the United States, it has in some states been entirely superseded by relief granted upon motion, while in other states it is recognised by statute and of frequent use. The writ of Audita Quere'la does not lie against the government.

Auditor, the name given to those who are appointed to examine accounts on behalf either of the government, of courts of law, of corporations, or of private persons. An auditor is usually, but not always, a professional accountant. His duties are to see that all payments and receipts in the accounts submitted to him are instructed by vouchers, or otherwise proved, that the accounts and books are properly kept and stated, and either to certify their accuracy, or point out any error he may discover.

AUDITOR OF THE COURT, in Scotland, is an officer whose duties, like those of *taking master* in England, consist of taxing the costs of suits in which expenses are found due, a remit being made to him for that purpose by the presiding judge.

AUDIT-OFFICE.—In 1785 public auditors were appointed, under the title of 'Commissioners for Auditing the Public Accounts;' and the patents of the two auditors of the imposts of the Admiralty were vacated, the sum of £7000 per annum being made payable to each of them for life. Many subsequent statutes have been passed for the purpose of extending and defining the duties of these commissioners, and regulating the business of the audit-office. In 1832 the powers and functions of the Commissioners of Public Accounts in Ireland were transferred to the Commissioners for Great Britain. In 1866 an Act was passed, 'to consolidate the powers and duties of the comptroller of Her Majesty's Exchequer and of the Commissioners for Auditing the Public Accounts, and to unite in one department the separate establishments under

them.' That department now consists of a comptroller and auditor-general, an assistant comptroller and auditor, and a large staff of clerks. The Audit Department is empowered to call on all Keepers of Public Accounts to account for moneys or stores intrusted to them. The accounts of Army and Navy, of Land Revenue and the like, are accordingly examined by this branch.

Auditory Nerve, or nerve of hearing, is the *portio mollis* of the seventh pair, distributed to the ear. See EAR, BRAIN, NERVOUS SYSTEM.

Audley, SIR JAMES, one of the original knights of the Order of the Garter, founded in 1344 by Edward III., in 1350 fought in the sea-fight of Sluys, and in 1354 attended Edward the Black Prince to France. He showed such bravery at the battle of Poitiers that the Prince declared him to be the bravest knight on his side, and conferred on him an annual revenue of 500 marks, which Audley immediately gave up to his four squires. Hearing of this act of generosity, the Prince conferred on him a further pension of 600 marks. Audley, in 1362, was governor of Aquitaine; in 1369, great seneschal of Poitou. He took part in the capture of La-Roche-sur-Yon in the same year, and died a few months after at Fontenay-le-Comte.

Audouin, JEAN VICTOR, naturalist, was born at Paris, 27th April 1797, and studied medicine and the natural sciences. Installed in 1833 as professor of Entomology at the Jardin des Plantes, he made special studies on the muscardine (a silkworm disease), the parasites infesting the vine, and other insect pests. He contributed to the scientific journals, wrote a book on the natural history of the French coasts (2 vols. 1830), and edited the section on insects in Cuvier's *Règne Animal*, but his chief work was his *Histoire des Insectes nuisibles à la Vigne* (1842). He died 9th November 1841.

Audran, GERARD, French engraver, was born at Lyons in 1640, and after three years at Rome, where he acquired a high reputation by his engraving of Pope Clement IX., was recalled to France by Colbert, and appointed engraver to Louis XIV. Here he engraved the works of Lebrun, illustrating the battles of Alexander, and many paintings by Raphael, Titian, Domenichino, Poussin, and others. He died at Paris in 1703. His nephews, Benoît (1661-1721) and Jean (1667-1756), were also engravers.

Audubon, JOHN JAMES, an eminent American ornithologist, was born on the plantation of his father (an officer in the French navy), near New Orleans, Louisiana, May 4, 1780. His mother was a lady of Spanish extraction, who, after the birth of four children, accompanied her husband to St Domingo, and there perished in the great negro insurrection. Visiting France with his children, the elder Audubon soon married again, settled his family in the city of Nantes, and resumed his duties in the French navy; and it was chiefly through his stepmother's indulgence that young Audubon was enabled to gratify his taste as a naturalist. His father undertook to educate him for the army or navy; but music, drawing, and the collection of natural history specimens usurped the attention that should have been given to mathematics, until finally the lad was sent to America to occupy a property in Eastern Pennsylvania, which his father had previously purchased. Here he lived for some time a sort of Bohemian naturalist, and here he married in 1808 Miss Lucy Bakewell, the daughter of a farmer. Immediately after, he sold his land, bought a stock of goods, and, with his

Copyright 1988 in U.S.
by J. B. Lippincott
Company.

wife and a French friend and partner, Rosier, migrated westward to engage in mercantile pursuits. A flat-bottomed boat conveyed the party down the Ohio from Pittsburg to Louisville, Kentucky, where they commenced trade, Audubon, however, spending his time principally away on expeditions with the neighbouring planters hunting birds, while Rosier 'stuck to the counter.' Business so conducted naturally proved unprofitable, and the firm removed first to Hendersonville, Kentucky, and next to St Genevieve, Missouri, where Audubon sold his interest to his partner and returned to Hendersonville. A succession of business misadventures speedily swept away all his funds, when, with 'his sick wife and his gun, his dog, and his drawings,' he returned to Louisville, and engaged in drawing portraits, whereby (here and subsequently in Cincinnati) he supported his family for a while in comfort. In 1820, however, he left Cincinnati, without a dollar, on an excursion down the Ohio and Mississippi rivers, stopping at the principal towns and drawing portraits, and adding at every available opportunity to his already wonderful collection of coloured designs of birds. He records that in one instance he executed portraits of a shoemaker and his wife in payment for two pairs of boots, one of which he gave to a destitute fellow-traveller, reserving the other pair for his scarcely less destitute self. After a precarious existence of this sort for some three years, Audubon visited the cities of the Atlantic coast with the view of publishing his works; but meeting with little encouragement, he returned to Louisiana, and taught classes in dancing. Encouraged and assisted by his wife, who was receiving nearly \$3000 a year as a teacher, he embarked for Europe in 1826, where he was received with great kindness by the leading scientists. Public exhibitions of his drawings in Liverpool and Edinburgh proved successful, and in 1827 he issued the prospectus of his great work, *The Birds of America*, to appear in numbers at two guineas each—each number to consist of five plates. He canvassed the British towns for subscribers, meanwhile painting and selling pictures to defray his current expenses, and in 1828 visited Paris, where his work received the highest encomiums—a report from Cuvier to the Paris Academy of Sciences declaring it 'the most magnificent monument which has yet been erected to ornithology.' The work embraces coloured figures of 1065 species of birds (natural size), the publication of which occupied some ten years, and is said to have cost £20,000 (\$400,000). In the meantime, Audubon visited America, and explored the least known regions of the Atlantic coast from Labrador to the Gulf of Mexico, returning to London, in the interest of his work, in 1837. In 1839 he settled with his family in New York city, visited the Yellowstone River in 1843, and subsequently, assisted by his sons, he published *The Quadrapeds of North America*, largely from materials prepared some years prior by himself and Dr John Bachman of South Carolina. He died 27 January 1851. See *Audubon, the Naturalist, in the New World*, by Mrs Horace St John (1856); *The Life of John J. Audubon, the Naturalist*, edited by his widow (1869).

Auenbrugger von Auenbrug. LEOPOLD, an Austrian physician, born at Gratz in 1722, practised at the Spanish hospital in Vienna, where he died in 1809. As early as 1754 he had discovered the method of investigating internal diseases which afterwards made him famous; but not until after seven years of experiments and verification did he publish his treatise, entitled *Inventum novum ex percussione thoracis humani*

interni pectoris morbos detegendi (Vienna, 1761). See PERCUSSION.

Auerbach, BERTHOLD, German novelist, was born, of Jewish parentage, at Nordstetten, in the Württemberg Black Forest, 28th February 1812. He received his education at the Talmud school of Hechingen, at Carlsruhe, at Stuttgart gymnasium, and at the universities of Tübingen, Munich, and Heidelberg, in 1836 suffering several months' imprisonment in the fortress of Hohemasperg as a member of the students' Burschenschaft. He had been destined for the synagogue, but had early abandoned theology for law, then law for history and philosophy—the philosophy, above all, of the great thinker of his race, Spinoza. A biographical romance, based on Spinoza's life, succeeded in 1837 his earliest work, *Das Judentum und die neueste Litteratur* (1836), and itself was followed by a translation of Spinoza's works (5 vols. 1841). In the first series of his *Schwarzwalder Dorfgeschichten* (1843), on which his fame chiefly rests, he gives charming pictures of Black Forest life, though his peasants too often are peasant Spinozas. The longer stories *Barfüssle* (1850), *Joseph im Schnee* (1861), and *Edelweiss* (1861): are good, but not so good; and the three-volume didactic romances of the third and last period of his literary career, though clever of course, are tedious to a degree. These were *Auf der Höhe* (1865), *Das Landhaus am Rhein* (1869), *Waldfried* (1874), &c.

'philosophical novels, in which,' in his own words, he 'undertook to treat problems of speculative ethics, and dealt not so much with events and actual conflicts in life as with conversations and the unfolding of definite objects of thought.' Many of Auerbach's works, which in German fill nearly 40 volumes, have been translated, not over well, into English. After a restless life, passed at Frankfurt, Vienna, Dresden, Berlin, &c., he died at Cannes, 8th February 1882. See *Berthold Auerbach, ein Gedenkblatt* (1882), and two volumes of his Correspondence (1884).

Auersperg. ANTON ALEXANDER, GRAF VON, German poet, was born at Laibach, April 11, 1806. Descended from an ancient Swabian family which, in the 11th century, had settled and acquired large estates in Carniola, he took a prominent position in the diet of that province (1861-67). In 1861 he was chosen a life-member of the upper house of the Austrian Reichsrath; and he died at Gratz, 12th September 1876. He was always distinguished by his Liberalism and his ultra-German sympathies; but he is best known under the *nom de plume* of Anastasius Grün, as one of the German epic and lyrical poets, among whom he holds a high rank, excelling most in humorous subjects and political satires. His collected works fill 7 vols. (1877). See the Life of him by Radicz (2 vols. 1876-78).

Auerstädt, a village in the Prussian province of Saxony, 10 miles W. of Naumburg. It is famous for the great battle which took place there October 14, 1806, between the French under Napoleon, and the Prussian army under Duke Charles of Brunswick, which ended in a great victory for the former. The Prussians, who numbered fully 48,000, left nearly half their men, dead or wounded, on the ground, while the French (30,000) escaped with a loss of only 7000. Napoleon who had, on the same day, defeated the main army of Frederick-William III. at Jena (q.v.), made Davoust Duke of Auerstädt.

Aufrecht, THODOR, philologist, born 7th January 1822 at Leschnitz in Upper Silesia. After studying at Berlin under Bopp, Böckh, and Lachmann, he settled there in 1850, and devoted himself to Sanskrit and the old German tongues. To this time of his life also belongs

his collaboration with Kirchhoff in the publication of *Unbrische Sprachdenkmäler* (2 vols. Berlin, 1849-5), an epoch-making work in the comparative study of the languages of ancient Italy; as well as the founding of the well-known *Zeitschrift für vergleichende Sprachforschung* (1852), in the editing of which he assisted A. Kuhn for some time. In 1852 he repaired to Oxford, where he helped Max Müller in his edition of the *Rigveda*, and was appointed to a place in the Bodleian Library, the fruit of which was his excellent *Catalogus codicum Sanscritorum bibliothecae Bodleianae Oxoniensis* (1864). In 1862 he became professor of Sanskrit and Comparative Philology at Edinburgh, and in 1875 resigned this chair for one at Bonn. Aufrecht has published scholarly editions of several classical Sanskrit works, most important being his *Rigveda*, in the Roman character (2d ed. 2 vols. Bonn, 1877).

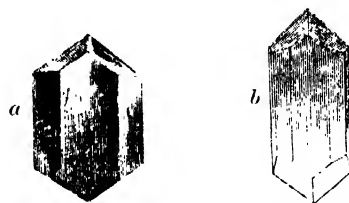
Augeas, or AUGELAS, son of Phorbas or of Helios (the sun), king of the Epeans in Elis. He had 3000 head of oxen in his stables, which had not been cleaned out for thirty years. Hercules was commissioned by Eurystheus to cleanse the Augean stables in one day, and was promised as payment a tenth part of the oxen. He accomplished the task by turning the courses of the rivers Peneus and Alpheus through the stables. Augeas now refused to pay the stipulated wages, whereupon Hercules killed him.

Augereau, PIERRE FRANÇOIS CHARLES, Duke of Castiglione, marshal and peer of France, one of the most brilliant and intrepid of that band of general officers whom Napoleon gathered around himself, was the son of a Paris fruiterer, and was born in 1757. After serving in the French and Neapolitan armies, he settled in Naples as a fencing-master in 1787. In 1792 he volunteered into the French revolutionary army, and in less than three years was made a general of division. In 1795 he accompanied the army to Italy, where he greatly distinguished himself, gaining glory in the battles of Lodi, Castiglione (in 1796, from which he afterwards received his title), and Roveredo. At Paris, in 1797, he carried through the *coup d'état* of the 4th September, and he soon became a supporter of Napoleon. In 1801 he received the command of the army in Holland. In 1804 he was made a marshal; commanded a wing at Jena and at Eylau; was governor at Berlin, and fought at Leipzig in 1813. He sat in the chamber of peers after the restoration, and died in 1816.

Augier, GUILLAUME VICTOR EMILE, a French dramatist, was born at Valence, September 17, 1820, and was educated as a lawyer. In 1844 he composed a drama in verse, *La Cigale*, which was played at the Odéon with success. Other dramas in verse are *Gabrielle* (1849), *Diane* (1852), *La Jeunesse* (1858), and *Paul Forestier* (1868). Originally criticised as a leader of the 'school of good sense,' he ultimately dealt unsparingly with the vicious tendencies of modern life, though never forsaking the idealist standpoint. His later dramas are mostly in prose, and may be said to belong to the comedy of intrigue. Notable works are *Le Mariage d'Olympe* (1855); *Le Gendre de M. Poirier* (1854), written in partnership with Jules Sandeau; *Les Femmes Pauvres* (1858); *Les Effrontés* (1861); *Le Fils de Giboyer* (1862); *Maître Guérin* (1869); and *Les Fourchambault* (1874), his masterpiece. In a number of his works he was a collaborateur with other dramatists. In 1858 he became a member of the Academy, and in 1868 Commander of the Legion of Honour. He died 28th October 1889. His *Théâtre complet* fills 4 vols. (1876-77).

Augite (Gr. *augē*, 'brilliant'), one of the Pyroxene (Gr. *pyr*, 'fire,' and *xenos*, 'a guest')

group of minerals, is very nearly allied to Hornblende (q.v.). Augite consists of 47-56 per cent. of silica, 20-25 per cent. of lime, and 12-19 per cent. of magnesia, the magnesia sometimes giving place in whole or in part to protoxide of iron, and some varieties containing a little alumina, or a little protoxide of manganese. Its specific gravity is 3.195-3.525. It is little affected by acids, or not at all. It is usually of a greenish colour, often nearly black. It crystallises in six or eight-sided



a, Common Augite; b, Green Augite.

prisms variously modified. It is an essential component of several igneous rocks, particularly of Basalt (q.v.) and its varieties, and it occurs as an accessory constituent in a great many more. It is in fact as a rock-constituent that augite derives its importance as a mineral species. Augite rock, consisting essentially of augite alone, occurs in the Pyrenees. It is rarely associated with quartz, in which respect it differs from hornblende, but very often with labradorite, olivine, nepheline, and leucite. Fluorine, which is generally present in small quantity in hornblende, has never been detected in augite. The form of the crystals is also different in the two minerals, as well as their cleavage. In augite, the cleavage-planes intersect nearly at right angles; in hornblende, the angles are 124° 30' and 55° 30'. Rose of Berlin endeavoured to show that the difference between augite and hornblende arises only from the different circumstances in which crystallisation has taken place, and that augite is the production of a comparatively rapid, and hornblende of a comparatively slow cooling. His views have been supported by experiments, and by a comparison of augite with certain crystalline substances occurring among the scoriae of foundries. *Dioptase*, *Sahlite*, and *Coccolite* are varieties of augite.—*Diallage* (q.v.) and *Hypersthene* (q.v.) are very nearly allied to it.

Augmentation, in Heraldry, an additional charge in a coat of arms bestowed by the sovereign as a mark of honour. Augmentations have generally been granted to be borne on a canton, on an escutcheon *en surcoat*, or on a chief. The bearings on the chiefs of augmentation bestowed on the military and naval heroes of England in the beginning of the present century, are for the most part so confused and unarmorial, that an intelligible description of them can scarcely be given in heraldic language.

Augmentation, in Music, is the reproduction of a melody, or principal subject of a composition, in the course of the progress of the piece, in notes of greater length than those notes in which the melody is first introduced. The tempo remains unaltered. Augmentation is of great importance in the treatment of the subjects, or themes, for fugues, and when cleverly used, produces great effects.

Augmentación, PROCESS OF, in Scots law, an action in the Court of Teinds (q.v.) by the minister of a parish against the titular or person entitled to the five teinds, the patron, or the landowners, for the purpose of procuring an increase to his stipend.

The moderator and clerk of the presbytery to which the minister belongs must also be called as parties. A period of twenty years must elapse before the minister becomes entitled to a fresh augmentation. There must of course be some free teind in the parish—i.e. teind not previously applied to stipend, otherwise there can be no augmentation. In many parishes the teinds are exhausted. The amount of the augmentation is fixed, or modified, as it is termed, in so many chalders of grain or victual, generally Linlithgow measure of oatmeal and barley: the stipend itself being paid in money, according to the Fairs Prices (q.v.) of each year. In the modification of a suitable stipend, regard is had to the state of the teinds, the extent of the parish, the population to be cared for, the expense of living, and the like; but a general cause, such as the Repeal of the Corn Laws, was not held to justify an augmentation. It is usual to give three or four chalders. This process has the further object in view of *localling* the stipend so modified—i.e. of assigning it in due proportions to the heritors or other parties in possession of the teinds. This object is attained by means of what is called a scheme of locality—an allotment of the stipend modified to the several parties liable therefor. This scheme is prepared at the instance of the second junior Lord Ordinary (q.v.), on a remit from the Teind Court. The last conclusion in a summons of augmentation is for a suitable sum, or increase to the sum already allowed, for communion elements—i.e. for bread, wine, and other necessities for celebrating the sacrament of the Lord's Supper after the Presbyterian fashion. In the case of large town parishes, as much as £30 has been given to each of the collegiate ministers. When there is not sufficient teind to bring the stipend up to £150 per annum, with £8, 6s. 8d. for communion elements, it is provided that the deficiency shall be paid by the Exchequer. Much discontent is felt with the tedious and expensive nature of augmentations, especially where in an urban parish the stipend has to be allocated over a great number of small rentals. Litigation frequently occurs as to the rights held to teinds, and the validity of the valuations of teinds made early in the 17th century. Questions between over-paying and under-paying heritors are also kept open for long periods of time. An attempt has recently been made to simplify augmentations, but the measure was not approved of by the dissenting communities.

AUGMENTATION OF BENEFICES is an important form of church extension in England. Much of the Queen Anne's Bounty is applied to this purpose, and under the Lord Chancellor's Act of 1863 nearly a quarter of a million sterling, realised by the sale of certain classes of advowson, has been similarly applied. See **STIPEND**, **GLEE**, **MANSE**; also **PARLIAMENTARY CHURCH**.

Augsburg, an historic city of Bavaria, capital of the province of Swabia, is situated in the angle between the rivers Wertach and Lech, 37 miles WNW. of Munich. Though presenting an antique and rather deserted appearance, Augsburg has numerous fine buildings, and one noble street, the Maximilian Strasse, adorned with three bronze fountains (1593-1602). The principal edifices are the Renaissance town house (1620), with its splendid 'Golden Hall'; the Pösch Tower, dating from the 11th century; the former episcopal palace, where, on 25th June 1530 the Protestant princes presented the Augsburg Confession to Charles V.; the grand old mansion of the Fuggerei; the 'Three Moors,' one of the most interesting hostels in Germany; and the Gothicised Romanesque cathedral (994-1121), with its bronze doors and early glass-paintings. The industry of Augsburg is once more vigorous.

Cotton is now the staple manufacture; and there are also large factories for woollens, paper, tobacco, and machinery. The gold and silver wares retain their ancient reputation; and printing, lithography, and bookselling have taken a new start, though the *Allgemeine Zeitung* (1798), the best known of the German newspapers, was in 1882 transferred to Munich. There are in Augsburg a dozen printing establishments, thrice that number of bookshops, and more than 70 breweries. Banking and stock-jobbing are extensively carried on; and Augsburg is still the emporium of the trade with Italy and Southern Germany, being the centre of a system of railways that connect it with Nuremberg, Leipzig, Switzerland, Munich, &c. Pop. (1871) 51,270; (1885) 65,476; of whom 66 per cent. were Catholics.

The foundation of Augsburg was the 'colony' planted by the Emperor Augustus, 12 B.C., after the conquest of the Vindelici, probably on the site of a former city of that people. It was called *Augusta Vindelicorum*, and hence the present name. It became the capital of the province of Rhaetia, was laid waste by the Huns in the 5th century, and came next under the dominion of the Frankish kings. In the war of Charlemagne with Thassilo of Bavaria, it was again destroyed (788). After the division of Charlemagne's empire, it came under the Duke of Swabia; but having become already rich by commerce, was able to purchase gradually many privileges, and finally became in 1276 a free city of the empire. It now rose to greater consequence than ever, and had reached the summit of its prosperity by the latter half of the 14th century. In 1368 its aristocratic government was set aside for a democratic, which lasted till 1548, when the aristocracy, favoured by Charles V., regained the ascendancy. Augsburg continued in great eminence for its commerce, manufactures, and art, till the war between Charles V. and the Protestant league of Schmalkald (1540). Along with Nuremberg it formed the emporium of the trade between Northern Europe and the south, and its merchants were princes whose ships were in all seas (see **FUGGER**). It was also the centre of German art as represented by the Holbeins, Burgkmaier, Altdorfer, and others. Many diets of the empire were held in Augsburg, and the leading events of the Reformation are associated with its name, as the Diet of Augsburg (1530), the Interim of Augsburg (1548), and the 'Religious Peace' of Augsburg (1555) by which the Protestants secured the full enjoyment of their rights and privileges (see **REFORMATION**). The discovery of the road to India by the Cape, and of America, turned the commerce of the world into new channels, and dried up the sources of Augsburg's prosperity. It ceased to be a free city on the abolition of the German empire in 1806, and was taken possession of by Bavaria.

Augsburg Confession, the chief standard of faith in the Lutheran Church. With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V., as protector of the church, had convoked a diet of the empire, to meet at Augsburg, 8th April 1530, and had required from the Protestants a short statement of the doctrines in which they departed from the Catholic Church. In March, therefore, the Elector, John of Saxony, called on his Wittenberg theologians, with Luther at their head, to draw up articles of faith, to lay before him at Torjan. The commissioned doctors took as a basis, in so far as pure doctrine was concerned, articles that had been agreed to the previous year at conferences held at Marburg and Schwabach, in the form of resolutions of the Lutheran reformers of Germany against the doctrines of Zwingli. These doctrinal articles, supplemented, and with a practical part newly added, were laid before the

Elector at Torgau. Melancthon then, taking as a foundation the Torgau articles, began at Augsburg in May, and, with the advice of various Protestant theologians, as well as princes and other secular authorities, composed the document which he first called an Apology, but which in the diet itself took the name of the Augsburg Confession. Luther was not present in Augsburg, being then under the ban of the empire, but his advice was had recourse to in its composition. The Torgau articles were in German; the Confession was both in German and Latin; and Melancthon laboured incessantly at its improvement till it was presented to the emperor, June 25. In composing the document, Melancthon sought to maintain a spirit of forbearance and conciliation, as well as to secure the utmost brevity and simplicity. The aim of the Confession was to give a collected view of the belief of the Lutheran Protestants, to lay a foundation for measures of reconciliation. The Protestant doctrines were stated in a form as near that of the Catholic views as possible, and their agreement with the church fathers carefully emphasised.

The first part of the Confession contains twenty-one articles of faith and doctrine: 1. Of God; 2. Of Original Sin; 3. Of the Son of God; 4. Of Justification; 5. Of Preaching; 6. Of New Obedience; 7 and 8. Of the Church; 9. Of Baptism; 10. Of the Lord's Supper; 11. Of Confession; 12. Of Penance; 13. Of the Use of Sacraments; 14. Of Church Government; 15. Of Church Order; 16. Of Secular Government; 17. Of Christ's Second Coming to Judgment; 18. Of Free Will; 19. Of the Cause of Sin; 20. Of Faith and Good Works; 21. Of the Worship of Saints. The second and more practical part, which is carried out at greater length, contains seven articles on disputed points: 22. On the Sacrament in Two Kinds; 23. Of the Marriage of Priests; 24. Of the Mass; 25. Of Confession; 26. Of Distinctions of Meat; 27. Of Conventual Vows; 28. Of the Authority of Bishops.

This document, signed by seven Protestant princes and two free cities, was read before the emperor and the diet, 25th June 1530. Melancthon, not looking upon the Confession as binding, began shortly after to make some alterations in its expression; at last, in 1540, he published a Latin edition (*Confessio Variata*) in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view to conciliation, he endeavoured to unite the views of the Lutherans and Calvinists. This gave rise subsequently to much controversy: orthodox Lutheranism repudiated the alterations of Melancthon, and long continued to subject his memory to great abuse; though it is clear that Melancthon and his adherents contemplated no substantial departure in doctrine from the original Confession. It is not certain that the form of the Confession found in the Lutheran standards is identical with the unaltered Augsburg Confession, as the two original documents—German and Latin—laid before the diet have been lost. The chief distinction between the orthodox Lutherans and the reformed churches of Germany has all along been adherence to the 'unaltered' or to the 'altered' Confession. It was even a matter of controversy whether the 'reformed' were entitled to the rights secured to the Protestants by the Religious Peace of Augsburg, concluded in 1555, on the ground of the 'unaltered' Confession. Though the Augsburg Confession is still formally adhered to by the Protestant churches of Germany, it is confessedly no longer the expression of the belief of the vast majority of the members, after the great advances made by theology, and the many alterations in public opinion and feeling.

Augsburg Interim. See INTERIM.

Auguries and **Auspices**, the observation and interpretation of omens as a means of obtaining knowledge of secret or future things. The general doctrine of the interpretation of divine revelation is called *Divination* (q.v.), and this more general term includes both *artificial* divination by prodigies, lightning, astrology, lots, observation of the flight or feeding of birds, and the appearance of the entrails of animals or haruspication, as well as *natural* divination through dreams and prophetic oracles. There was no natural divination among the Romans—they had not conceived, like the Greeks, that notion of inward inspiration and insight, by which a human soul is enlightened by a fateful intuition and made to participate for an instant in the divine omniscience. The supernatural faculty is confined to the gods themselves, and they speak directly to men through the passive organs of animals. From the very dawn of Roman history divination is a kind of political institution. It does not develop the curiosity of the mystic; it reduces revelation to nothing more than simply information on the actual dispositions of the gods, only touching indirectly the past and the future. It only asks one problem—to know if the gods encourage or not the design about which they are consulted; it awaits the reply from Jupiter himself, and forbids the inquiry to be made otherwise than through certain conventional signs. The augural art does not go further than this. If in certain grave conjunctures it was found insufficient, the Romans preferred to consult the Etruscan *haruspices* or the Hellenic oracles rather than to add anything to their traditional customs.

The two Latin words *augur* (*avis*, 'a bird,' and a root allied to Sanskrit root *gar*, 'to call') and *auspex* (for *avispector*, from *avis*, 'a bird,' and *specio*, 'I see') differed originally as a general idea from a particular one, since the latter observed only the flight of birds. Yet as this latter kind of augury was the most common, the two words are frequently interchanged or employed in connection. Neither vaticination or direct revelation, nor the interpretation of fortuitous presages, was so much esteemed by the Romans as the observation of birds. It was the function of the *augures* to explain their significance. It was not, however, any one who could be appointed an *augur*. The gods selected their own interpreters—that is to say, they conferred the divine gift upon them from their very birth; but an educational discipline was also considered necessary, and hence a 'college of augurs' figures in the very dawn of Roman history. Romulus himself is represented in legend as an *augur*. Previous to the Ogulian law, passed in the year 307 B.C., there were only four *augures*, who were selected from the patricians. By this law, however, the plebeians became eligible for the pontifical or augural offices, and five were immediately created. For more than two hundred years the number continued the same, till Sulla in 81 B.C. increased it to fifteen. Finally, in the first days of the Empire, when all parties, sick of the long civil wars, hurried to throw their privileges at the feet of the monarch who had brought peace into their homes, the right of electing *augures* at his pleasure was conferred on Augustus, after which the number became indefinite.

At first, the *augures* were elected by the *Comitia Curiata*; but as the sanction of the former was necessary to give validity to the acts of the latter, they could always veto any elections which were obnoxious to them; so that the power of electing members to fill up vacancies naturally fell into the hands of the college itself, and so continued till 103 B.C., when a tribune of the people named Ahenobarbus carried a law by which it was enacted that

for the future, vacancies in the augural and pontifical offices should not be filled up by those religious corporations themselves, but by a majority of certain selected tribes. This new law was occasionally repealed and re-enacted during the civil wars which lasted till the time of Augustus. The scramble for power, however, during these political vicissitudes, as well as the general advance of knowledge, had rendered the prophetic pretensions of the augur's office ridiculous in the eyes of educated people. By Cæsar's time it had lost its religious character altogether, but was still regarded as one of the highest political dignities, and coveted for the power it conferred.

The modes of divination employed by the augurs were five in number—*augurium ex cælo*, *ex aribus*, *ex tripudiis*, *ex quadrupedibus*, *ex diris*. The first related to the interpretation of the celestial phenomena, such as thunder and lightning, was apparently of Etruscan origin, and was held to be of supreme significance. The second related to the interpretation of the noise and flight of birds. It was not every bird, however, that could be a sure messenger of the gods. Generally speaking, those 'consulted' were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites*, or birds whose flight revealed the will of the gods; the last four to the class of *oscines*, whose voice divulged the same. These two modes of augury were the oldest and most important. Of the other three, the auguries *ex tripudiis* were taken from the feeding of chickens; the auguries *ex quadrupedibus*, from four-footed animals—as, for instance, if a dog, or wolf, or hare ran across the path of a Roman, and startled him by any unusual motion, he mentioned it to an augur, who was expected to be able to advise him what to do; the auguries *ex diris* (a vague kind of augury), from any trifling accidents or occurrences not included in the previous four such as sneezing, stumbling, spilling salt on the table, and the like.

At Rome, the auspices were taken on the summit of the Capitoline Hill; and the ground on which the augur stood was first solemnly set apart for the purpose. He next took a wand, and marked out a portion of the heavens in which his observations were to be made. This imaginary portion was called a *templum* (hence *contemplari*, 'to contemplate'), and was subdivided into right and left. According as the birds appeared in either of these divisions were the auspices favorable or unfavorable. How vast the political influence and authority of the augurs must have been is seen from the fact that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, king, consul, dictator, or prætor, every civic officer, every religious functionary, was invalid, if the auspices were unfavourable. No general could lawfully engage in battle—no public land could be allotted—no marriage or adoption, at least among the patricians, was held valid—unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by the veto of any member of the augural college.

Not the augurs alone, but the chief magistrates of Rome (inheriting the honour from Romulus), held the 'auspices,' while the 'augurs' were exclusively in the possession of the former. The power of taking the auspices in war was confined to the commander-in-chief; and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase in our language, 'under the auspices' of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name.

It must not be supposed that it was among the Romans alone that augury was practised. It is well known in the folklore of every race, and there are few English peasants to whom the magpie and cuckoo are not still significant. Dr Tylor quotes in his *Primitive Culture* many instances which show that it has always been and is still part of the doctrine of the savage in whatever quarter of the globe he is found. It is familiar to the Tupis of Brazil and the Dyaks of Borneo. The Maoris think it unlucky if an owl hoots during a consultation, but are encouraged if a hawk flies overhead; a flight of birds to the right of the warsacrifice is propitious if the villages of the tribe are in that quarter, but if the omen is in the enemies' direction the war will be given up. The Kalmuck is happy when a white owl flies by on the right, but expects calamity when he sees one on the left; and to the negro of Old Calabar the direction in which he hears the cry of the great kingfisher has exactly the same significance. Haruspication also is practised by the Malays and Polynesians and by various Asiatic tribes. It is mentioned as practised in Peru under the Incas, and Sir Richard Burton's account of it in Central Africa is in all respects similar to its usage among the civilised Romans. See the great work of Bouché-Leclercq, *Histoire de la Divination dans l'Antiquité* (4 vols. 1880-82).

August, the sixth month in the Roman year, which began with March, was originally styled *Sextilis*, and received its present name in honour of the Emperor Augustus, several of the most fortunate events of his life having occurred during this month. In this month he was first admitted to the consulate, and thrice entered the city in triumph. In the same month, the legions from the Janiculum placed themselves under his auspices, Egypt was brought under the authority of the Roman people, and an end put to the civil wars. To make it equal with the fifth month, whose name had been changed from *Quintilis* to *Julius* in honour of Julius Cæsar, a day was taken from February and added to August.

Augusta, or AGOSTA, a fortified city of Sicily, 11 miles N. of Syracuse by rail. It stands on a rocky islet joined by a bridge to a peninsula projecting into the Mediterranean, and is near the site of the *Megara Hyblæa* of the ancients. The port is spacious, but of rather difficult access. Salt, oil, wine, cheese, fruit, honey, and sardines are exported. Pop. (1881) 12,210. The town often suffered during the wars of the middle ages, and was in great part destroyed by earthquakes in 1693 and in 1848. Near it was fought in 1676 a great naval battle between the French under Duquesne, and a Spanish and Dutch fleet under the famous admiral De Ruyter. The latter was defeated, and received a wound of which he died at Syracuse.

Augusta, the capital of Maine, U.S., on the Kennebec, 63 miles NNE. of Portland by rail. It stands at the head of regular navigation, but small steamers run 18 miles higher. A dam, 17 feet high, affords considerable water-power, which is rendered available by a canal along the west bank, on which side the city is principally built. There are several cotton and other mills, and in 1886 a new system of waterworks was introduced. Besides the state-house and other administrative buildings, Augusta contains a U.S. arsenal; and at Togus, 4 miles distant, is situated one of the national institutions for disabled soldiers, with accommodation for 1350 persons. Pop. (1880) 8665; (1890) 10,527.

Augusta, the third city of Georgia, U.S., is situated on the Savannah River, 231 miles from its mouth, but only 132 miles from Savannah by rail. It is the head of steamboat navigation on the river, which is here spanned by three bridges,

connecting the town with Hamburg, S.C., and which is crossed by a stone dam, 1720 feet in length, from which a canal, 8 miles long and 150 feet wide, supplies water both for domestic use and for the mills. These latter are numerous, about \$4,000,000 being invested in cotton factories, and \$3,000,000 in other manufacturing enterprises. Augusta is the seat of the Medical College of Georgia (1832), and contains several other handsome public buildings, the city being generally well and regularly built. Pop. (1860) 12,493; (1880) 21,891; (1890) 33,300.

Augustenburg, a village of 600 inhabitants on a bay of the island of Alsén (q.v.). Its castle (1776) was formerly the residence of the Dukes of Holstein-Sonderburg-Augustenburg.

Augusti, JOHANN CHRISTIAN WILHELM, a learned German theologian, born in 1772 near Gotha. He studied at Jena, and successively filled there the chairs of Philosophy and of Oriental Languages. But in 1812 he accepted a theological professorship in Breslau, and in 1819 one at Bonn. He died in 1841. In the early part of his career, Augusti was a decided rationalist; but subsequently he returned to orthodox Lutheranism. His writings, marked by great learning, industry, and spirit, comprise works in the history of Christian dogma and an introduction to the Old Testament; but the most valuable is his manual of Christian Archaeology (Leip. 3 vols. 1836-37).

Augustine, ST (AURELIUS AUGUSTINUS), the greatest of the Latin fathers, was born at Tagaste, a town of Numidia, on the 13th of November 354 A.D. His father, Patricius, was poor, but of good family, and filled the office of magistrate. He continued a pagan till advanced in years, and was only baptised shortly before his death. He does not seem to have been remarkable for any elevation of mind; on the contrary, one may fairly conclude, from his son's statements, that he was an irascible, kind-hearted man, more intent on his son's advancement in this world than in that which is to come. Patricius was very anxious that Augustine should become a fine scholar, as he noticed that not a few people in his day were obtaining large incomes by their 'wits.' Augustine was accordingly sent to school at Madaura, and subsequently to Carthage, to complete his studies. Previous to this, however, he had enjoyed the inestimable felicity of a religious education at home. His godly mother, Monica, had been his best instructor. Neander truly says: 'Whatever treasures of virtue and worth the life of faith, even of a soul not trained by scientific culture, can bestow, were set before him in the example of his pious mother.'

The energy and penetration of intellect exhibited by the young Augustine excited the most flattering hopes. When he left home for Carthage, a joyous, ardent, and resolute student, a bright career of worldly prosperity seemed to open before him. But strong as Augustine was, the temptations of Carthage were stronger. His nature, deep, impetuous, and passionate, thirsted for excitement. He had just reached the age when pleasure is conceived to be synonymous with happiness, and Carthage, the second city of the empire, was ranked as Rome in its sensual corruptions. Augustine fell. In his *Confessions* he paints the frightful abyss into which he felt himself plunged; nor does he seek to excuse himself; on the contrary, the shadow of his guilt is thrown forward over all his boyish life, and he displays even a morbid zeal and acuteness in pointing out what others, less censorious, might term the frivolous errors of his childhood, but which seemed to Augustine the parents of his subsequent vices, and therefore equally bad and equally reprehensible. Before he had reached

his eighteenth year, his mistress bore him a son, who was named Adeodatus afterwards baptised along with him at Milan. The thing which appears to have first stirred his deeper being into life was a passage which he suddenly came across in the *Hortensius* of Cicero, treating of the worth and dignity of philosophy. Fascinated by 'the delusive pretensions of the Manichean sect, which, instead of a blind belief on authority held out the promise of clear knowledge and a satisfactory solution of all questions relating to things human and divine,' Augustine now became a professed Manichean. Returning to his native town, he lectured for a short time on 'grammar'—that is to say, on literature. Soon afterwards, he returned to Carthage, to pursue his profession under more favourable auspices. Here he wrote, in his twenty-seventh year, his first work, *De Apto et Pulchro*—a treatise on aesthetics, which has unfortunately been lost. About the same time his spiritual nature became keener and more imperative in its demands. The futile speculations of the visionary sect to which he had attached himself now became apparent. He had a series of interviews and conversations with Faustus, one of the most celebrated teachers of Manichæism; and these so utterly disappointed his expectations, that he left the society in disgust and sad bewilderment, after having wasted ten years in a fruitless search for wisdom and truth.

In 383 he went to Rome, followed by the tears, the prayers, and the anxieties of his excellent mother, who was not, however, bereaved of hope, for both her faith and her love were strong. After a short stay, Augustine left Rome, and proceeded to Milan, where he became a teacher of rhetoric. No change could have been more fortunate. At this time the Bishop of Milan was the eloquent and devout St Ambrose. An intimacy sprang up between the two, and Augustine, who was at this time a zealous student of Plato, often went to hear his friend preach. He confesses that the Platonic writings 'enkindled in his mind an incredible ardour; they awakened his deeper spiritual nature, which keenly upbraided him with his sins. Once more he studied the Bible, wishing to find in it those truths which he had already made himself acquainted with from the Platonic philosophy, but presented in a different form.' He began to think that Christ and Paul, by their glorious life and death, their divine morality, their great holiness, and manifold virtues, must have enjoyed much of that 'highest wisdom' which the philosophers thought confined to themselves. For some time he clung to his Platonic Christianity, and shaped the doctrines of the Bible according to it; but when he found that it was weak to overcome temptations, and that 'he himself was continually borne down by the ungodly impulses which he thought he had already subdued,' the necessity of a living personal God and Saviour to rescue him from the condemnation of his own conscience, and impart a sanctifying vitality to the abstract truths which he worshipped, shone clear through all the stormy struggles of his heart. In the eighth and ninth books of his *Confessions* he has left a noble though painful picture of his inward life during this momentous crisis. It is sufficient to say that the Spirit of God triumphed. On the 25th of April 387 A.D., Augustine, along with his natural son Adeodatus, was baptised by Ambrose at Milan. Shortly after, he set out on his return home. At Ostia, on the Tiber, his beloved mother, who had followed him to Milan, died; her eyes had seen the salvation of her son, and she could depart in peace. After her death, and before leaving Italy for Africa, Augustine wrote his treatises, *De Moribus*

Ecclesie Catholice et de Moribus Manichæorum; De Quantitate Animæ; and De Libero Arbitrio. His character and principles of action had become fixed, and he now brought the whole majesty of his intellect to bear upon the side of Christianity. Having, as was then customary for converts, divided his goods among the poor, he retired into private life, and composed several treatises—*De Genesi contra Manichæos, De Musica, De Magistro, and De Verâ Religione*, which secured him a high reputation. In 391 he was ordained a priest by Valerius, Bishop of Hippo in Numidia; and during the next four years, though earnestly engaged in the work of preaching, contrived to write three different works. In 395 he was made colleague of Valerius. Then ensued a period of hot strife, known in church history as the Donatist and Pelagian controversies. Augustine, as may naturally be supposed, having passed through so fierce a fire of personal experience on religious questions, would be very jealous both of what he *knew* to be the truth, and of what he only *thought* to be the truth. This, added to his acute and profound intellect, made him, in spite of the poverty of his historical erudition, a most formidable and relentless antagonist. But this portion of his career will fall to be treated more properly under PELAGIUS and DONATISTS (q.v.). In 397 appeared his *Confessiones*, in 13 books. It is a deep, earnest, and sacred autobiography of one of the greatest intellects the world has seen. Passages of it have no parallel except in the Psalms of David. In 413 he commenced his *De Civitate Dei*, and finished it in 426. It is generally considered his most powerful work. Intended to be a great vindication of the Christian church, conceived of as a new order rising on the ruins of the old Roman empire, it is not only the grandest and most philosophical of the earlier monuments of Christian theology, but one of the most profound and lasting monuments of human genius. Yet exception may be taken to much that it contains. The learning is no doubt very considerable, but it is not accurate. Augustine was an indifferent scholar; he had studied the Latin authors well; but of Greek he knew little, and of Hebrew, nothing; consequently many of his reasonings are based on false and untenable premises, and he errs often in his etymological explanations. In 428 Augustine published his *Retractiones*, in which he makes a recension of all his previous writings. It is a work of great candour. He frankly acknowledges such errors and mistakes as he had discovered himself to have committed, explains and modifies numerous statements, and modestly reviews his whole opinions. His end was now drawing nigh. In 429 the Vandals, under the barbarian Genseric, landed in Africa; next year they besieged Hippo. Augustine, now in his seventy-sixth year, prayed that God would help his unhappy church, and grant himself a release out of this present evil world. He died on the 28th of August 430, in the third month of the siege.

No mind has exerted greater influence on the church than that of Augustine. No controversy of his age was settled without his voice, and in his Letters (which fill a whole volume of the Benedictine edition of his works) we see the vastness of his empire, the variety of subjects on which appeal was made to him, and the deference with which his judgment was received. Consistency of theological opinion is not to be looked for from him, nor from any of the church fathers. A larger sphere of freedom was permitted to religious speculation in those unfettered days, before creeds were encircled with that traditional sanctity they now possess. Nevertheless, we have little difficulty in determining the central

tenets of his theological belief. He held the corruption of human nature through the fall of man, and the consequent slavery of the human will. Both on metaphysical and religious grounds, he asserted the doctrine of predestination, from which he necessarily deduced the corollary doctrines of election and reprobation; and finally, he strenuously supported, against the Pelagians, not only these opinions, but also the doctrine of the perseverance of the saints. At the same time, it is but fair to add that, even on such points, his language is far from uniform; that much of the severity of his doctrines arose from the bitter and painful remembrance of his own early sins, and from the profound impression which the corrupt state of society in his time, and the vast desolations of barbarism, had made on his earnest and susceptible soul; and that, in his desire to give glory to God, he sometimes forgot to be just to man. In illustration of this may be mentioned the fact that the maxim which justified the chastisement of religious errors by civil penalties, even to burning, was established and confirmed by the authority of Augustine, and thus transmitted to succeeding ages. In his epistle to Dulcitius, a civil magistrate who shrank from putting in force the edict of Honorius against heretics, he uses these words: 'It is much better that some should perish by their own fires, than that the whole body should burn in the everlasting flames of Gehenna, through the desert of their impious dissension.' In the opinion of Neander, it was to the somewhat narrow culture, and the peculiar personal experience and temperament of Augustine, that the doctrines of absolute predestination and irresistible grace, first systematised by him, owed much of that harshness and one-sidedness which so long obstructed their general reception by the church, and which continue to render them repulsive to multitudes. It was not, however, by his controversial writings merely, but by his profound conception of Christianity and the religious life, and by his personal fervour and force of character that Augustine moulded the spirit of the Christian church for centuries. The church regarded him as the greatest of the fathers, and at the Reformation Protestants and Catholics alike appealed to his authority. Calvinism is by many regarded as little more than a reassertion of Augustinianism, though this is denied by the Catholic Church; and Jansenism was held by its supporters as the only real expression of Augustine's views. See articles CALVIN, JANSEN, ELECTION, HELL, PREDESTINATION, WILL.

The best complete edition of his works is that of the Benedictines, published at Paris in 8 vols. (11 parts) folio (1679-1700; reprinted in 22 half-vols. 1836-40). They occupy 16 vols. (32-47) of Migne's *Patrologia Latina*. Numerous editions of the *Confessiones* and *De Civitate Dei* have appeared. A complete English translation of his works was published at Edinburgh in 15 vols. (1872-80) under the general editorship of Dr Marcus Dods, the *City of God* being by the editor, the *Confessiones* by the Rev. J. G. Pilkington, the *Letters* by the Rev. J. G. Cunningham.

See the Church Histories of Tillemont and Neander; Milman's *Latin Christianity*; also Cloth, *Der heil. Kirchenlehrer Augustin* (Aachen, 1840); Bindemann, *Der heilige Augustin* (Berlin, 1844-69); Poujoulat, *Histoire de Saint Augustin* (6th ed. Tours, 1875); Dorner, *Augustin, sein theologisches System und seine religionsphilos. Anschauung* (Berlin, 1873); Bohringer, *Augustin* (Stuttgart, 1877-78); and W. Cunningham, *St. Austin and his Place in the History of Christian Thought*, the Hulsean Lecture for 1885.

Augustine. or AUSTIN, St., first Archbishop of Canterbury, was prior of the Benedictine monastery

of St Andrew at Rome, when, in 596, he was sent, with forty other monks, by Pope Gregory I., to convert the Anglo-Saxons to Christianity, and establish the authority of the Roman see in Britain. Landing in Thanet, the missionaries were kindly received by Ethelbert, king of Kent, whose wife Bertha, daughter of the Frankish king, was a Christian, and retained a bishop in her suite as chaplain. A residence was assigned to them at Canterbury, where they devoted themselves to monastic exercises and preaching. The conversion and baptism of the king contributed greatly to the success of their efforts among his subjects, and it is recorded that in one day Augustine baptised 10,000 persons in the river Swale. Nominal as much of this conversion must have been, there is abundant testimony to the fact that a marked improvement in the life and manners of the Anglo-Saxons followed the evangelistic labours of Augustine and his companions. In 597 he went to Arles, and there was consecrated Bishop of the English. On his return, he despatched a presbyter and monk to Rome, to inform the pope of his success, and obtain instruction on certain questions. Gregory's counsels with regard to the propagation of the faith are admirable examples of that pious ingenuity which has often characterised the missionary policy of the Church of Rome. Thus, instead of destroying the heathen temples, Augustine was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. Augustine's subsequent efforts to extend his authority over the native British church, with whose bishops he held a conference in 603 at Aust on the Severn, were not so successful as his missionary labours. He died 26th May 604, and eight years afterwards his body was translated to his abbey of SS. Peter and Paul, whose site is now occupied by St Augustine's Missionary College, Canterbury (1848).

Augustinians, the name given to several religious bodies in the Roman Catholic Church. Whether St Augustine ever framed any formal rule of monastic life, is uncertain; but one was deduced from his writings, and was adopted by as many as thirty monastic fraternities, of which the chief were the Canons Regular of St Augustine, the Begging Hermits or Austin Friars, the Friars Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The Canons Regular of St Augustine, or Austin Canons, appear to have been founded or remodelled about the middle of the 11th century. Their discipline was less severe than that of monks properly so called, but more rigid than that of the secular or parochial clergy. They lived under one roof, having a common dormitory and refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. Probably founded at Avignon about 1061 they had their first seat in England at Colchester (*circa* 1105); and at the Reformation their houses somewhat exceeded 200 in number. Of some 25 houses in Scotland, the earliest was that of Scone (1114), and the others of most note were at Incheolm in the Firth of Forth, St Andrews, Holyrood, Cambuskenneth, and Incheaffray.

The Begging Hermits, Hermits of St Augustine, or Austin Friars, were a much more austere order, renouncing all property, and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the 11th and 12th centuries, existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the

rival fraternities of Dominicans and Franciscans, Pope Innocent IV., about the middle of the 13th century, imposed on them the rule of St Augustine, whom they claimed as their founder. In 1256 Pope Alexander IV. placed them under the control of a superior or president called a 'general.' In 1287 a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570 Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence they were called *discalceati*, or 'bare-footed friars.'

The degeneracy of the order in the 14th century, called into existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. But in his day, even these had fallen victims to the general corruption of monasticism, and were not undeserving of his unsparing denunciations. After the French Revolution, the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and Southern Germany. It was diminished even in Austria and Naples. It is most powerful in America, its colleges in the New World having been founded by Augustinians from the Irish province, and at present it possesses about a dozen houses in Ireland and one in London.

The name of Augustines was given also to an order of nuns who claimed descent from a convent founded by St Augustine at Hippo, and of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. The Hôtel-Dieu at Paris is still served by them.

Augustovo, a town of Russian Poland, in the government of Suwalki, on the Netta, a feeder of the Bug, 138 miles N.E. of Warsaw. It was founded by Sigismund Augustus, king of Poland, in 1547. It has woollen and linen manufactures, and some trade in horses and cattle. Pop. (1879) 11,004.

Augustulus, ROMULUS, the last emperor of the western half of the old Roman empire. His name was Augustus, but he diminutive title under which he is universally known was given him by the Romans on account of the essential littleness of his character. His father, Orestes, a Pannonian of good birth and wealth, had risen to high rank under the Emperor Julius Nepos, whose favour he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the emperor, Orestes conferred the vacant throne on his son Augustulus (476 A.D.), retaining all substantial power in his own hands. Orestes failing to conciliate the barbarians, who had helped him against Nepos, with a grant of one-third of the lands of Italy, they, under the command of Odoacer, besieged him in Pavia, and killed him on the capture of the town. Augustulus yielded at once, and being of too little consequence to be put to death, was dismissed to a villa near Naples with an annual pension of 6000 pieces of gold. His after-fate is unknown.

Augustus, CAIUS JULIUS CESAR OCTAVIANUS, son of Caius Octavius and Atia (Julius Caesar's niece), was born in 63 B.C. The Octavian family came originally from Velitæ, in the country of the Volsci; and the branch to which Augustus belonged was rich and honourable. His father had risen to the rank of senator and prætor, but died in the prime of life, when Augustus was only four years old. Augustus was carefully educated in Rome under the guardianship of his mother and his step-father; and his talents recommended him to his great-uncle, Julius Caesar, who adopted him as his son and

heir. At the time of Caesar's assassination (44 B.C.), Augustus was a student under the celebrated orator Apollodorus, at Apollonia in Illyricum, whither, however, he had been sent chiefly to gain practical instruction in military affairs. He returned to Italy, and, now first learning that he was his uncle's heir, assumed the name of Julius Caesar Octavianus. The soldiers at Brundisium saluted him as Caesar; but he declined their offers, and entered Rome almost alone. The city was at this time divided between the republicans and the friends of Mark Antony; but the latter, by adroit manoeuvres, had gained the ascendancy, and enjoyed almost absolute power. At first, Augustus was haughtily treated by Antony, who refused to surrender Caesar's property; but after some fighting, in which Antony was worsted, and forced to flee across the Alps, Augustus, who had made himself a favourite with the people and the army, obtained the consulship, and carried out Caesar's will. He found an able advocate in Cicero, who at first had regarded him with contempt. To himself the great orator seemed to be labouring in behalf of the republic, whereas he really was only an instrument for raising Augustus to supreme power. When Antony returned from Gaul with Lepidus, Augustus threw off the republican mask, and joined them in establishing a triumvirate. He obtained Africa, Sardinia, and Sicily; Antony, Gaul; and Lepidus, Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy, and by the victory at Philippi over the republicans under Brutus and Cassius. The Perusine war, excited by Fulvia, wife of Antony, seemed likely to lead to a contest between Augustus and his rival; but was ended by Fulvia's death, and the subsequent marriage of Antony with Octavia, sister of Augustus. Shortly afterwards, the Roman world was divided anew, Augustus taking the western half, and Antony the eastern, whilst Lepidus had to content himself with Africa. The contest for supremacy commenced. While Antony was lost in luxurious dissipation at the court of Cleopatra, Augustus was industriously striving to gain the love and confidence of the Roman people, and to damage his rival in public estimation. War was at length declared against the Egyptian queen, and at the naval battle of Actium (31 B.C.), Augustus was victorious, and became sole ruler of the whole Roman world. Antony and Cleopatra soon afterwards ended their lives by suicide; Antony's son by Fulvia, and Caesarion, son of Caesar and Cleopatra, were put to death; and in 29 B.C., after regulating affairs in Egypt, Greece, Syria, and Asia Minor, Augustus returned to Rome in triumph, and, closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favour, he abolished the laws of the triumvirate, and reformed many abuses. Hitherto, since Caesar's death, he had been named Octavian; but now the title of *Augustus* ('sacred' or 'consecrated') was conferred on him. In his eleventh consulship (23 B.C.), the tribunician power was granted him for life by the senate. Republican names and forms still remained, but they were mere shadows; and Augustus, in all but name, was absolute monarch. In 12 B.C., on the death of Lepidus, he had the high title of Pontifex Maximus bestowed on him. The nation surrendered to him all the power and honour that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, &c., Augustus (1 B.C.) suffered the one crushing defeat of his long rule, in the person of Quintilius Varus, whose army was

annihilated by the Germans under Arminius (q.v.). The loss so afflicted Augustus, that for some time he allowed his beard and hair to grow, as a sign of deep mourning, and often exclaimed: 'O Varus, Varus, give me back my legions!' Thenceforth he confined himself to plans of domestic improvement and reform, and so beautified Rome, that it was said, 'Augustus found the city built of brick, and left it built of marble.' He also built cities in several parts of the empire; and altars were raised by the grateful people to commemorate his beneficence; while by a decree of the senate, the name Augustus was given to the month *Septilis*.

Though thus surrounded with honour and prosperity, Augustus was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He had no son, and his nephew Marcellus, and Caius and Lucius, his daughter's sons, whom he had appointed as his successors and heirs, as well as his favourite step-son Drusus, all died early; while his step-son Tiberius was an unamiable character whom he could not love. Age, sorrow, and failing health warned him to seek repose; and, to recruit his strength, he undertook a journey to Campania; but his infirmity increased, and he died at Nola (14 A.D.), in the seventy-seventh year of his age. According to tradition, shortly before his death, he called for a mirror, arranged his hair neatly, and said to his attendants: 'Did I play my part well? If so, applaud me!' Augustus had consummate tact and address as a ruler and politician, and made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by himself. He encouraged agriculture, patronised the arts and literature, and was himself an author; though only a few fragments of his writings have been preserved. Horace, Virgil, Ovid, Propertius, Tibullus, and Livy, greatest of Latin poets and scholars, belonged to the *Augustan Age*, a name since applied in France to the reign of Louis XIV., in England to that of Queen Anne.

Augustus, Elector of Saxony (1553-86), was born July 31, 1526, at Freiberg, and spent much of his boyhood at Prague, where he formed an intimate friendship with Maximilian, King Ferdinand's son, afterwards Emperor of Germany. In 1548 he married Anna, daughter of Christian III. of Denmark, who was universally popular on account of her devoted adherence to Lutheranism and her domestic worth. After the death of his brother Maurice in 1553, Augustus succeeded to the electorate. His rule is chiefly noticeable as bearing upon the history of the newly established Protestant Church. Equally intolerant and inconsistent in his theology, Augustus first used his utmost influence in favour of the Calvinistic doctrine of the sacraments; and then, in 1574, adopted the Lutheran tenets, and persecuted the Calvinists. On the other hand, it must be owned that he introduced valuable reforms in both jurisprudence and finance, and gave a decided impetus to education, agriculture, manufactures, and commerce. The Dresden Library owes its origin to him, as do also most of its galleries of art and science. He died at Dresden, February 11, 1586, and was succeeded by his son, Christian I.

Augustus II. (more accurately, **FREDERICK-AUGUSTUS I.**), Elector of Saxony and King of Poland, second son of the Elector, John George III., was born at Dresden, May 12, 1670. His extraordinary strength gained him the nickname of 'the Strong.' From 1687 to 1689 he travelled over the greater part of Europe, and in 1694 succeeded his brother George as Elector, and

undertook the command of the imperial army against the Turks in Hungary. After the battle of Olasch, in 1696, he returned to Vienna as a candidate for the throne of Poland, vacated by John Sobieski. Bidding higher than Prince Conti for the crown, and adopting the Catholic faith, he was elected king by the venal nobles, and was crowned in 1697. On ascending the throne, he promised to regain, for his new kingdom, the provinces that had been ceded to Sweden; but his efforts to do this only led to the defeat of himself and his allies, his own deposition as king of Poland, the election of Stanislaus Leszcynski, and the ignominious peace of Altranst dt in 1706. So complete was his humiliation, that Augustus was compelled to send a letter of congratulation to the new Polish king, together with all the crown-jewels and archives. However, on the defeat of Charles XII. at Pultowa, in 1709, he declared the treaty of Altranst dt annulled, marched with a powerful army into Poland, formed a fresh alliance with the czar, and recommenced a war with Sweden, which continued raging with redoubled fury, till the death of Charles XII., in 1718, led to a peace with Sweden. Meanwhile, the jealousy of the Poles caused the withdrawal of the Saxon troops in 1717. The remainder of the reign is marked by no important event, till the king's death, 1st February 1733. The Saxon court gradually became known as the most dissolute in Europe, and the resources of both kingdoms were shamefully squandered to supply its extravagances. Augustus supported the fine arts as ministering to luxury, but did little for the cause of science. Reckless, selfish, ambitious, luxurious, licentious, and despotic, he is powerfully depicted in Carlyle's *Frederick the Great*. By his wife he left an only son, who succeeded him. The most celebrated of his numerous illegitimate off-spring—amounting, it is affirmed, to somewhere about 300—was Count Maurice of Saxony.

Augustus III. (or **FREDERICK-AUGUSTUS II.**) the son and successor of the above, was born at Dresden, October 7, 1696, and carefully educated by his mother in the Protestant faith. In the course of a tour through Europe, however, he changed his religion, secretly professing Catholicism at Bologna in 1712, though the fact was not publicly known in Saxony till five years later. He succeeded his father as Elector in 1733, and was chosen king of Poland by a part of the nobility. Jealousy of French influence secured him the support of Russia and Austria against Stanislaus Leszcynski, who had married a daughter of Louis XV., and three years later Augustus was elected. He inherited his father's sumptuous tastes, though not his talents; and he enriched the gallery of Dresden with noble paintings, for which, and its china, his capital now began to be celebrated. In 1742, alarmed at the increased power Prussia had obtained by the conquest of Silesia, Augustus formed an alliance with Maria Theresa; and by the secret treaty of Leipzig, contracted to supply her with 50,000 men. But their united troops were completely routed by the Prussians in 1745; and Frederick II. pushing on into Saxony, Augustus had to escape from his capital, saving his art-treasures, but leaving his state-papers in the hands of the conqueror. In 1746 the peace of Dresden restored him Saxony; but the close of the year again saw him embroiled with Prussia. Joining the camp at Pirna, he narrowly escaped being taken prisoner, and had to flee to Poland. At the conclusion of the peace of Hubertsburg, Augustus returned to Dresden, where he died, October 5, 1763. The notorious Count Br hl (q.v.) was his favourite, and from 1746

onwards, his prime-minister. His son, Frederick-Christian, succeeded him in the electorate, and Stanislaus Poniatowski became king of Poland.

Auk (*Alca*), a genus of web-footed birds, the type of a family called Alc de, which was in great part included in the Linnaean genus *Alca*, and to many of the species of which, now ranked in other genera, the name auk is still popularly extended. The Alc de are amongst those web-footed birds collectively called Brachypteres (i.e. short-winged) or Divers by Cuvier, remarkable for the shortness of their wings, which they employ as fins or paddles for swimming under water, some being even incapable of flying; and for the position of their legs, further backward than in other birds, which makes walking difficult, and compels them, when on land, to maintain an upright attitude. They are distinguished by the very compressed bill, which, in the true auks, is vertically elevated, and so sharp along the ridge as to resemble the blade of a knife; and by their entirely palmated feet, destitute of hind toes. The auks are confined solely to the seas of the northern hemisphere—the penguins taking their place in the southern. All of them have a dense plumage, which generally exhibits on its surface a beautifully polished appearance and silvery lustre. The genus *Alca*, as restricted by Cuvier and others, contains only two species, distinguished from the Puffins (q.v.), which also belong to this family, chiefly by the greater length of the bill, and its being covered with feathers as far as the nostrils. The bill, both in the auks and puffins, is transversely and strongly grooved. But even the two known species of the



The Great Auk (*Alca impennis*).

restricted genus *Alca* differ from one another in a most important particular—the wings of the one, the Great Auk, being so short that it is quite incapable of flight, like the penguins, of which it may be deemed the true northern representative, whilst the other, the Razor-bill, has comparatively long wings, and flies well.—The GREAT AUK (*Alca impennis*), so far as is known, is now extinct. It was about three feet in height. It was an inhabitant of the temperate region of the North Atlantic. At one time large numbers bred on St Kilda, and in prehistoric times it appears to have bred on Oronsay or neighbouring skerries, and possibly frequented other islands of the Hebrides. It occasionally was met with at Orkney and Shetland, and probably bred at Papa Westra until 1812. It was rarely met with along the shores

of Norway and Sweden, but in prehistoric times frequented the fjords of Denmark, as its remains have been repeatedly found in the Danish kitchen-middens. There is only one breeding-place in Greenland on record, and that is Ginnbjorneskjoerne, supposed to be the same as Danell's or Graah's Islands. It bred on several skerries off the coast of Iceland, and the last Great Auk was supposed to have been killed on one of these named Eldey in 1844. In the North American habitat it bred in great numbers on Funk and other islands off the coast of Newfoundland, on some islands in the Bay of St Lawrence, at Cape Breton, and probably at Cape Cod. Its remains have been found in shell-heaps at several places on the coast of Maine and Massachusetts. The Great Auk was invaluable as food, and but for the abundant fresh supplies afforded by its carcases to the early voyagers, the fisheries at the Banks of Newfoundland would hardly have been developed as they were. The birds were so stupid, they sat still until they were knocked over by the seamen's short clubs, or allowed themselves to be driven on board the vessels in hundreds across sails or planks stretched from the gunwales to the shore. The rapidity with which this bird moved under water was extraordinary; one of them having been pursued by a six-oared boat for hours in vain. Like most of the Alcaide, the Great Auk each year laid only one egg, about 5 inches in length, and 3 in maximum breadth. It laid it on the bare rock, without any attempt at a nest. The eggs of the Great Auk are scarce and valuable curiosities; they have repeatedly brought more than £100, and in 1888 one was sold by auction for £225. At that date only 66 auk's eggs were known to exist; and only some 72 skins and 40 bones of the Great Auk are to be found in collections.—The RAZOR-BILL (q.v.) is the only other species (*A. torda*) now commonly included in the genus *Alca*. The name LITTLE AUK (*Mergulus alle*, formerly *Alca alle*) is often given to a bird also called the Rotche (q.v.), common in Arctic regions.—All the auks feed upon fishes, crustaceans, and other marine animals, which they pursue under water, and for which they dive to great depths. See Symington Grieve's *The Great Auk* (Edin. 1885).

Aulapolai', or ALLEPPI, a seaport, with a lighthouse, in Travancore state, Madras, 33 miles S. of Cochin. Its roadstead is sheltered by a mud-bank; and there is a considerable trade in coffee, coir, pepper, and cardamoms. Communication is maintained with Quilon and Trivandrum on the south, and with Cochin on the north, by canals parallel with the sea-coast, and connecting a series of lakes or back-waters. Between these and the sea is a wide creek, through which is floated the timber for exportation, which is brought from the forests of the Rajah of Travancore on the Western Ghats. Pop. 30,000.

Aula Regis, also called CURIA REGIS, is a name used in English history for a feudal assembly of tenants-in-chief, for the Privy-council (q.v.), and for the court of King's Bench (q.v.).

Aulic Council (Lat. *aula*, 'court' or 'hall'; Ger. *Reichshofrath*), a court of the Holy Roman empire, established in 1501 by Maximilian I., and co-ordinate with the Imperial Chamber (*Reichskammergericht*, 1495). See HOLY ROMAN EMPIRE.

Aulus Gellius. See CELLIUS.

Aumale (earlier *Athamaric*), a French town of 2000 inhabitants, in the department of Seine-inferieure, on the Breste. Since 1547 it has given the title of duke to various families.—AUMALE, a town of Algeria, 57 miles SE. of Algiers. It is

a strong military post, with barracks, magazines, and hospitals. Pop. 5196.

Aumale, CHARLES DE LORRAINE, DUC D', born 1556, was an ardent partisan of the League in the religious wars which devastated France in the latter half of the 16th century. The aim of the League was ostensibly to suppress the Huguenots, but in reality to secure the supreme power to the Guises. Closely allied by blood to this crafty and ambitious family, Aumale, after the murder of the Duke of Guise in 1588, became, along with the Duke of Mayenne, the leader of the party. Defeated at Senlis by the Duke of Longueville, and at Arques and Ivry by Henry IV., he still attempted to defend Paris, and when Henry was recognised as king in France, he went over to the Spaniards, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel. His property was confiscated, but he himself escaped. He lived in exile till his death, which took place at Brussels in 1631. With him the old Dukes d'Aumale of the house of Lorraine became extinct.

Aumale, HENRI - EUGENE - PHILIPPE - LOUIS D'ORLEANS, DUC D', fourth son of King Louis-Philippe, was born at Paris, January 16, 1822. Educated at the college of Henri IV., at sixteen he entered the army, and two years later found himself in active service in Algeria, where he soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. One of his most brilliant exploits was the surprise of Abd-el-Kader in May 1843. For this he was made lieutenant-general, and appointed to the government of the province of Constantine. In 1847 he succeeded Marshal Bugeaud in the governor-generalship of Algeria, but after the revolution of February 1848, laid down his office, and retired to England. In his exile he occupied himself with historical and military studies, and soon became known by his contributions to the *Revue des Deux Mondes*. A speech of Prince Napoleon in the senate against the Orleans family called forth in April 1861 his famous pamphlet, *Lettre sur l'histoire de France*, in which the prince and Napoleon III. were subjected to a merciless castigation. His great historical work, *Histoire des Princes de Condé* (Paris, 1869), was published only after much difficulty. In the journal *Étude Polye* there appeared (1865-66) a series of critical letters by him, under the pseudonym of 'Vrax,' on the policy of the empire, and in 1867 his celebrated work, *Les Institutions militaires de la France*. On the outbreak of the Franco-German war, he offered his services, first to the emperor, afterwards to the provisional government, without being accepted by either, but in 1871 he was elected a member of the Assembly. In 1873 he presided over the council of war which tried Marshal Bazaine, and afterwards held several high military commands, but was removed from the last of these, the post of inspector-general of the army, in 1883. Elected a member of the Academy in 1871, in 1886 he made known his intention to bequeath his magnificent chateau of Chantilly to the Institute of France. His wife (née Marie Caroline Auguste de Bourbon, daughter of the Prince of Salerno) had died in 1867; as well as his two sons, the elder in 1866, the younger in 1872.

Anne, the French cloth-measure corresponding to the English *Ell* (q.v.).

Aungerville, RICHARD, Bishop of Durham, is known as Richard de Bury, from his birthplace, Bury St Edmunds. He was born in 1281, studied with distinction at Oxford, became a Benedictine monk at Durham, and was made tutor to Edward

of Windsor, afterwards Edward III., by whom in after-years numerous honours were bestowed upon him. In 1333 he was appointed Dean of Wells, and in the same year was made Bishop of Durham by the pope at the king's request, despite the fact of the monks having elected their sub-prior, Robert de Graystones. After holding the office of high chancellor for a year, he resigned it in 1335 to act as the king's ambassador in Paris, Hainault, and Germany. In 1337 he was employed as a commissioner for the affairs of Scotland, and in 1342 he arranged a truce with the Scottish king. He died in 1345. Richard administered the affairs of his diocese with ability, as appears from his chancery rolls, which are the earliest preserved in the archives of Durham. An admirable ecclesiastic, he was kind and charitable to the poor. But he is chiefly known as a scholar and patron of learning, and he used his high offices of state to gratify his passion for discovering manuscripts and collecting books. His principal work, *Philobiblon*, was intended to serve as a handbook to the library which he founded in connection with Durham College at Oxford (afterwards suppressed). It gives an interesting account of how he collected his library, describes the state of learning in England and France, and closes with an explanation of the rules for the management of his library, which were founded on those adopted for the library of the Sorbonne. He had wide literary sympathies, commended the study of the poets, and provided his library with Greek and Hebrew grammars as a means of correcting the prevailing ignorance of these languages. At the dissolution of the monasteries, the books of his library went partly to the Bodleian, partly to Balliol College, and partly to the purchaser of Durham College.

Aurantia'ceæ (from late Lat. *aurantium*, 'an orange'), an order of Thalimifloral Dicotyledons, frequently grouped under Rutaceæ, are trees and shrubs, often of great beauty. The order contains about one hundred known species, natives of warm climates, and almost all of the East Indies, but now largely diffused by cultivation. The species of the genus *Citrus* are the best known, among which are the orange, lemon, citron, &c. But many other genera produce agreeable fruits, among which the Bael-fruit (*Egle marmelos*, q.v.) and the Wampee (*Cookia pumelata*) deserve particular notice. The fruits, ripe and unripe, juice and rind, the flowers, leaves, bark, &c. of a number of species are employed medicinally, their properties being largely due to the fragrant volatile oil, which abounds especially in the leaves and the rind of the fruit. See BÆL-FRUIT, CITRON, LEMON, LIME, ORANGE, SHADDOCK.

Auray, a port in the French department of Morbihan, 20 miles E. of Lorient by rail, with some trade. Pop. 5000. Here is a large deaf and dumb institute; and 2 miles north is the famous place of pilgrimage of St Anne of Auray, with a fine church completed in 1877.

Aure'lia. See CHRYSALIS.

Aurelianus, LUCIUS DOMITIUS—also named CLAUDIUS DOMITIUS and VALERIUS—one of the most powerful of the Roman emperors, was of very humble origin, his father having been a husbandman. He was born in Dacia or Pannonia about 212 A.D., and enlisting early as a common soldier, he rapidly distinguished himself, and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270), Aurelian was elected emperor by the army, with whom his great stature, strength, and courage had made him very popular. He commenced his reign by repulsing the barbarian Alemanni Marcomanni, and then proceeded to erect a new

line of fortified walls round Rome, the ruins of which may still be traced. Finding that the province of Dacia could not be maintained against the assaults of the Goths, he surrendered it on certain conditions, and strengthened the frontier of the Roman empire by making the Danube its boundary. He next turned his attention to the East, where the renowned queen, Zenobia (q.v.), had extended her sway from Syria to Asia Minor and Egypt. Aurelian defeated her in two battles, and besieged her in Palmyra, from which she attempted to escape when she saw defence would prove unavailing. She was, however, taken prisoner, and soon after the city surrendered, and was treated leniently. Shortly after he had departed, a new insurrection took place. He returned in 273, and gave the splendid city up to destruction. Aurelian was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of great influence, which he speedily quelled. In Gaul, Tetricus, who had held imperial power since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelian. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, this prince merited the title awarded to him by the senate—'Restorer of the Roman Empire.' He was assassinated at the instigation of a faithless secretary, between Hieraclea and Byzantium, during his campaign against the Persians (275).

Aurelius. MARCUS AURELIUS ANTONINUS, the best of the Roman emperors, and one of the noblest figures in history, was the son of Annus Verus and Domitia Calvilla, and was born at Rome on the 26th of April 121 A.D. His original name was Marcus Annus Verus. On the death of his father, he was adopted by his grandfather, who spared no pains to render him pre-eminent in every art and science. His fine qualities early attracted the notice of the Emperor Hadrian, who, playing on the boy's paternal name of Verus, used to call him *Verissimus* ('the most true'), and who conferred high honours on him while yet a child. When only seventeen years of age, he was adopted, along with L. Ceionius Commodus, by Antoninus Pius, who had succeeded Hadrian; and Faustina, the daughter of Pius, was selected for his wife. In the year 140 A.D. he was made consul; and from this period to the death of Pius in 161, he continued to discharge his public duties with the greatest promptitude and fidelity, while he maintained relations with the emperor of the warmest and most friendly kind. On his accession to the throne, with characteristic magnanimity he voluntarily divided the government with his adopted brother, young Commodus, called since his adoption Lucius Aurelius Verus. As the latter excelled in manly exercises, Aurelius determined to intrust to him the management of war. Towards the close of 161, the Parthian war broke out, and Verus was sent to quell it; but he proved himself completely incompetent, and only the ability of his generals, especially Avidius Cassius, saved the Romans from disaster. Verus on his return enjoyed a triumph to which he had no real claim; for all the victories had been won by others while he was revelling in the most extravagant licentiousness. Meanwhile clouds were forming on the horizon elsewhere. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Catti waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself a pestilence began to rage, believed to have been brought home by the troops of Verus; while frightful inundations and earthquakes laid large portions of the city in ruins, destroyed the granaries in which were kept

the supplies of corn, and thus created widespread famine and distress, adding to the terror which the citizens entertained of their savage enemies. Aurelius now resolved to lead his legions to the war himself. He was completely successful. The Marcomanni, and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube, were humbled, and compelled to sue for peace in 168; a year later Verus died. The contest was renewed two years afterwards, and the emperor was obliged to make up for the ravages of plague among his soldiers by enlisting vast numbers of gladiators and slaves. He made Pannonia his headquarters, and drove out the Marcomanni, whom he subsequently all but annihilated in crossing the Danube. The most famous victory of the war was that gained over the Quadi in 174 A.D., which was attributed by the Christians to an answer to the prayers of some soldiers of their faith in what afterwards became known as the 'Thundering Legion.' It is certain that a signal deliverance did save the army from disaster. Entangled in a defile, and under a broiling sun, the soldiers were ready to perish from thirst and fatigue, when suddenly the cloudless sky darkened, and heavy showers of rain fell, which they caught eagerly in their helmets. While they were thus engaged, the enemy attacked, and would have cut them to pieces had not a blinding storm of hail and lightning fallen immediately on their faces. But this deliverance was ascribed by the Romans to the prayers of the emperor himself, and it is certain that the title in question had belonged to a particular legion since the time of Augustus. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission, and obtain clemency. Hardly had the emperor had a moment's respite before he was summoned to the East by a rebellion of the ambitious governor, Avidius Cassius, who had seized the whole of Asia Minor. Before Aurelius arrived, the usurper had fallen by an assassin's hand. The emperor's conduct on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the Fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. On his arrival in the East, he exhibited the same illustrious magnanimity. He burned the papers of Cassius without reading them, so that he might not be tempted to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; and disarmed the enmity and dispelled the fears of the nobles who had openly favoured his insurgent lieutenant. While pursuing his work of restoring tranquillity, his wife Faustina died in an obscure village at the foot of Mount Taurus; and her husband, though he could scarcely have been unconscious of her unworthiness, paid the most lavish honours to her memory.

On his way home he visited Lower Egypt and Greece, displaying everywhere the greatest solicitude for the welfare of his vast empire. At Athens, which this imperial pagan philosopher must have venerated as a pious Jew venerates Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects.—Platonic, Stoic, Peripatetic, and Epicurean. No man ever laboured more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Towards the close of the year 176, he reached Italy, and celebrated his merciful and bloodless triumph. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile

barbarians. Victory again crowned his arms; but his constitution, never robust, and now shattered by perpetual anxiety and fatigue, at length gave way, and he died either at Vienna or at Sirmium, on the 17th of March 180, in the fifty-ninth year of his age, and the twentieth of his reign.

Marcus Aurelius was the flower of the Stoic philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced as pure and gentle an example of humanity as the records of either pagan or Christian history can show. In him stoicism loses all its haughty self-assertion, and is replaced by a humility that is usually regarded as the most peculiar, if almost the rarest, of the Christian graces. His youth was marked by the same lofty virtue as his maturer life. Already at twelve years of age the young philosopher was an avowed follower of Zeno and Epictetus. The Stoics, Diogenes, Apollonius, and Junius Rusticus, were his teachers, and he himself must be considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes Atticus and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the state, he did not disdain to attend the school of Sextus of Chironia, a grandson of the celebrated Plutarch. Men of letters were his most intimate friends, and received the highest honours both when alive and dead. His own range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. There are few books that have had such a potent charm over so many hearts as the sad *Meditations* of Aurelius. His sentences reveal the loneliness of his soul, but they show us that he did not suffer himself to be embittered as well as saddened by his experience of life. A kind of self-revelation, marked by a penetrating insight, they reveal the rare serenity and elevation of his heart, and its rarer tenderness and pity. We must not forget that he did not cultivate philosophy merely in the spring time of his life, when enthusiasm was strong, and experience had not saddened his thoughts, and when study was his only labour, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained uncorrupted to the end of his noble life his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship, and was believed to appear in dreams, like the saints of subsequent Christian ages.

Aurelius twice persecuted the Christians: in the first persecution (166) Polycarp perished; in the second (177), Irenæus. Many have found it difficult to understand how a mind of such lofty virtue should have consented to the persecution of Christianity. The explanation is to be found in that very earnestness with which he clung to the old faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was therefore compara-

tively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. As a ruler he felt that he dared not let society fall to pieces, and that it was his duty to preserve the ties of time-honoured custom, which apparently knit it together.

The best edition of his *Meditations* is still that with Latin notes by Gataker (London, 1697). The work is written in Greek, and small as it is, is one of the most precious relics of antiquity. Translations are numerous in every European language—a good one in English is that by George Long (1869). See Rpmā's *Marc Aurele* (1882), and Watson's *Life of Marcus Aurelius Antoninus* (New York, 1884).

Aurich, a town in the Prussian province of Hanover, almost in the centre of East Friesland, 16 miles NE. of Emden by rail. It has a large horse market, and brews celebrated beer. Pop. (1885) 5399.

Auricles, two cavities of the heart. See HEART.

Auricula, a genus, and **Auriculidae**, a family of Gasteropod Mollusca (Lat. *auricula*, 'a little



Auricula.

ear'). They have a spiral shell, covered with a horny epidermis, the first whorl very large and the spire short, the lip elongated, thickened, and toothed. The respiratory organ, or 'lung,' is a space below the mantle, on the walls of which the blood is exposed to the freely admitted air. They thus belong to the Pulmonate order of Gasteropods—i.e. to the same order as the common snails, having respiratory organs adapted for breathing in air, though some of them are capable of subsisting for a considerable time in water. Some inhabit fresh-water marshes, while others prefer the vicinity of salt water. They generally belong to warm climates, and some of them attain a large size. *Auricula midas*, a native of the East Indies, is known to shell-collectors by the name of Midas's Ear.

Auricula (*Primula auricula*), a congener of the Primrose (q.v.), much cultivated in flower-gardens. The auricula has long been a florist's flower. It was highly esteemed by the Romans, and has, at least since the 17th century, received particular attention from the florists of England and Holland. It is one of those flowers the cultivation of which is often most successfully prosecuted in the little gardens of operatives near large towns. Lancashire is particularly famous for it.—The auricula has smooth, dark-green leaves, stems, and calices, covered with a mealy powder. A similar fine dust appears also on the flowers, and adds much to their beauty. Hence the popular name in Scotland of 'Dusty Miller.' The auricula is a native of the Alps and other mountains of the middle and south of Europe, and of sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria; it grows in shady and moist places. In a wild state it has comparatively small flowers, of a simple yellow colour, on short stalks, forming an umbel of generally six or seven flowers, with the same delightful fragrance which aids so much to make it a favourite flower in cultivation. The leaves are

used by the inhabitants of the Alps as a remedy for coughs.

By cultivation and selection the auricula has been brought to great beauty and splendour of colour. More than 1200 varieties were reckoned as early as 1850, and new ones are continually raised from seed. All shades and combinations of



Auricula (*Primula auricula*).

yellow, maroon, and purple, usually disposed in concentric rings, are predominant; and English florists classify these into five main types, green-edged, white edged, gray edged, self-coloured, and alpine, the latter having the margin of two blended colours with a yellow centre. The meakness of the flower differs much in different varieties. The auricula blooms in April and May, and often also a second time at the end of autumn, which adds to the charms of the flower-border, although it is to the first or proper flowering-season that the florist looks. It succeeds best in a rich light soil, and cultivators diligently prepare for it composts of various kinds, but in general consisting chiefly of fresh loamy soil, and of well rotted horse or cow dung, often with the addition of a little sand. The finer varieties are always cultivated in pots, and require protection from severe weather in winter, and from wind and rain while flowering. They ought, however, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August. When it is proposed to raise the auricula from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air, hand glasses being placed over them during heavy rains. The seed is sown either in autumn or spring, generally in boxes placed under shelter, or in a slight hot-bed. The more weakly plants are tended with particular care, as they are generally found to produce the finest flowers.

The name auricula is derived from *auris*, an ear, on account of a fancied resemblance of the leaf to the ears of an animal.

Auricular Confession. See CONFESSION.

Auriculate, in Botany, a term applied to leaves, stipules, &c. and signifying that they have at the base two small ear-like lobes.

Aurillac, capital of the department of Cantal, in the southern part of Central France, on the right bank of the Jourdanne, 116 miles SW. of Clermont by rail. The town is mainly modern, but contains an old castle and two churches of the 14th and 15th centuries. It manufactures lace, copper vessels,

chemicals, chocolate, and cement, and has a trade in horses, cattle, and cheese. Annual races are held here, and there are two mineral wells. Here Pope Sylvester H. was born. Pop. (1881) 12,860.

Aurochs is properly the German name of the extinct species of wild ox, called by Cæsar *Urus* (q.v.). Recently the name has been erroneously used for the Bison (q.v.), still found in Lithuania.

Aurora, an enterprising city of the United States, in Kane county, Illinois, is located on Fox River, at the junction of several railroads, 39 miles WSW. of Chicago. It has machine-shops, flour-mills, manufactories of woollens, cottons, watches, corsets, silver ware, carriages, and extensive railroad workshops. Pop. (1860) 6011; (1880) 11,873; (1890) 19,688.—**AURORA** is also the name of a village in Indiana, on the Ohio, 24 miles W. by S. of Cincinnati. Pop. (1880) 4435; (1890) 3928.

Aurora, the Latin name corresponding to the Eös of Greek Mythology, the goddess of the dawn, was the daughter of Hyperion and Theia, and sister of Helios and Selene, and wife of the Titan Astræus, to whom she bore the winds, Argestes, Zephyrus, Boreus, Notus, as well as Hesperus, the morning-star. She was described as rising in the morning from her bed in the ocean, borne along on a chariot drawn by the divine steeds Lampus and Phaëthon, ascending heaven from the river Oceanus, where she lifted with her 'rosy fingers' the curtain of night, and announced the light both to gods and men. Homer frequently describes Aurora as the goddess of day, and the tragic writers identified Aurora with *Hemera* (the day). She was represented as clothed in a rosy-yellow robe, with a star shining on her forehead, and a torch in her right hand. She carried off several mortal youths of great beauty, among them Orion, Cephalus, and Tithonus.

Auro'ra Borealis, or **NORTHERN LIGHTS**, the name given to the luminous phenomenon which is seen towards the north of the heavens by the inhabitants of the higher latitudes. During the winter of the northern hemisphere, the inhabitants of the arctic zone are without the light of the sun for months together, and their long dreary night is relieved by this beautiful meteor, which occurs with great frequency in these regions. Those who have explored the southern seas have seen the same phenomenon in the direction of the south pole, so that the term Polar Lights might be more appropriate than Northern Lights to designate the aurora. In the phenomenon as seen in the southern hemisphere, the name aurora Australis is used. The appearance of the aurora borealis has been described by a great variety of observers in Northern Europe and in America, all of whom give substantially the same account of the manner in which the phenomenon takes place. It is briefly as follows: A dingy aspect of the sky in the direction of the north is generally the precursor of the aurora; and this gradually becomes darker in colour, and assumes the form of a circular segment, surrounded by a luminous arch, and such an approaching near to the horizon. This *arch segment*, as it is called, has the appearance of a thick cloud, and is frequently seen as such in the fading twilight before the development of the auroral light. Its density must, however, be very small, as stars are sometimes seen shining brightly through it. This dark segment is bounded by a continuous luminous *arch* of a transparent white with a touch of green, which varies in breadth from 1 to 6 diameters of the moon, having the lower edge sharply defined, and the upper edge only when the breadth of the arch is small. This arch may be considered to be a part of a luminous ring elevated at a considerable distance above the earth's surface, and having its

summit in most cases nearly in the magnetic meridian. An observer several degrees south of this auroral ring would see towards the north only a small arc of it, the larger part being hid by the earth; to one situated not so far south, it would appear as a larger and higher arch; to one placed below it, it would be seen as an arch passing through the zenith; and to one situated within the ring and farther north, it would be found as an arch culminating in the south. On this supposition nearly all the various positions of the auroral arch may be accounted for. The centre of the ring corresponds probably with the magnetic north, which is at present situated in the island of Boothia Felix. Hence it is that in Greenland, which is situated to the east of this island, the auroral arch has been seen stretching from north to south with its highest point in the west. The luminous arch, once formed, may remain visible for several hours, and is in a constant state of motion. It rises and falls, extends towards the east and towards the west, and breaks sometimes in one part, sometimes in another. These motions become all the more observable when the arch is about to shoot forth *rays*; then it becomes luminous at one point, eats in upon the dark segment, and a ray of similar brightness to the arch mounts with the rapidity of lightning towards the zenith. The ray seldom keeps the same form for any length of time; but undergoes continual changes, moving eastward and westward, and fluttering like a ribbon agitated by the wind. After some time it gradually fades in brightness, and at last gives way to other rays. When the rays are very bright, they sometimes assume a green, sometimes a violet, a purple, or a rose colour, giving to the whole a variegated and brilliant effect. When the rays darted by the luminous arch are numerous and of great length, they culminate in a point which is situated in the prolongation of the dipping-needle, somewhat south-east of the zenith. There they form what is called the *Boreal Crown*; and the whole heavens, towards the east, west, and north, present the appearance of a vast cupola of fire, supported by columns of variously coloured light. When the rays begin to be darted less brilliantly, the crown first disappears, then, here and there, the light becomes faint and intermittent, till at last the whole phenomenon fades from the sky.

The preceding description indicates the general features of the appearance of the aurora borealis; but several auroras have been described which presented striking peculiarities. Sometimes the phenomenon assumed the form of one or more curtains of light, depending from dingy clouds, whose folds were agitated to and fro, as if by the wind. Sometimes this curtain seemed to consist of separate ribbons of light, arranged side by side in groups of different lengths, and attaining their greatest brilliancy at the lower edges. In this country it is only on rare occasions, such as in 1870, that the aurora borealis occurs with the brilliancy which attends it in northern latitudes, but this description portrays the type to which such appearance of the meteor more or less approximates.

The height of the aurora has been variously estimated. The first observers were inclined to place the seat of it beyond the atmosphere; but this hypothesis is untenable, as the aurora does not seem to be affected by the rotation of the earth, but appears to be in every respect a terrestrial phenomenon. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, the heights most generally are from about 45 to 100 miles. Some authors have assigned heights as low as 5 miles, and others as high as 500 miles and even higher, but the results of recent research are not confirmatory of these

extremes. The distance of the stations at which the same aurora has been visible, indicates the enormous geographical extent, and likewise the great altitude which the phenomenon frequently attains. One aurora, for instance—that which occurred on the 25th October 1870—was seen over a large portion of the northern hemisphere, and at the same time *auroræ* were seen at many places in

when the sun is near the horizon. Other lines, however, have been seen, which cannot as yet be produced by the physicist from any known substance.

Lemström has shown by the observations and experiments he made at Sodankylä, that auroræ are due to currents of positive electricity illuminating the atmosphere in their passage to the earth.

Luminous appearances accompanied the setting in of a current towards the earth from the network of insulated wires with which he overspread the top of Mount Oratunturi, and this light was clearly auroral, giving the hitherto enigmatical citron line of Ångström referred to above, which is the invariable constituent of auroral radiations. Other faint and indistinct lines are enumerated as present, and Lemström is of opinion that there is a tolerable agreement between some of these and the lines in the laboratory spectrum of rarefied air, but the whole subject demands further investigation.

Loomis and Fritz have severally investigated the geographical distribution of the aurora borealis. The following woodcut is from Loomis, from which it is seen that the region of greatest auroral action is an oval shaped zone surrounding the north pole, whose central line



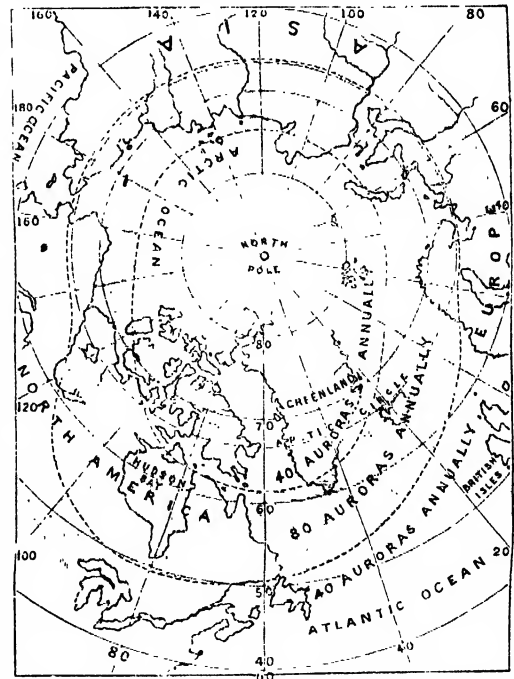
Aurora Borealis.

the southern hemisphere. Dr Sophus Tromholt, who carried out a series of investigations on the subject of the aurora borealis in the extreme north of Norway, states that the light of the aurora is never serviceable to people in their work; its contribution to lighten the darkness is almost nil; the momentary flashes of real luminosity are very brief and of no practical value.

The noise that is alleged to accompany the aurora borealis in high latitudes would indicate for it a comparatively moderate height; but we can scarcely yet be said to be in possession of indisputable instances of its being heard by competent observers. See the subject discussed in communications to *Nature*, especially one by Tromholt in vol. xxvii. p. 499.

The intimate connection between the aurora borealis and the magnetism of the earth is shown by various facts. During the occurrence of the phenomenon, the magnetic needle appears very much disturbed, sometimes deviating several degrees from its normal position, and appearing to be most affected when the aurora is brightest; and this oscillation is frequently perceived far beyond the district where the aurora is seen. The vertex, likewise, of the luminous arch is almost always found to be in or very near the magnetic meridian, and the boreal crown has its seat in the prolongation of the freely suspended needle. There seems, moreover, to be a connection between the magnetic poles of the earth in regard to the aurora, for, as has been frequently ascertained, the meteor occurs simultaneously at both. The aurora borealis appears to be an electric discharge connected with magnetic disturbance. If one of Cassiot's vacuum tubes be brought near an electric machine, or between the poles of an induction coil, flashes of light pass between the ends, which bear a striking resemblance to the aurora borealis. A comparison of the spectra of the two goes far to establish identity.

The auroral spectral line, discovered by Ångström in 1867, is a yellow line near the sodium line, and is the same as the air line seen in the solar light



Map showing the geographical distribution of the Aurora Borealis.

crosses the meridian of Washington in latitude 56°, and the meridian of St Petersburg in latitude 71°. It follows from this that auroræ are more frequent in North America than in the same

latitudes in Europe. Loomis points out that this auroral zone bears considerable resemblance to a magnetic parallel or line everywhere perpendicular to a magnetic meridian.

It is a fact of the greatest significance that as regards geographical distribution, aurora and thunderstorms are complementary, aurora being not more characteristically of polar than thunderstorms are of tropical origin. Auroræ are, however, subject to extremely complicated periodicities, indicating systematic magnetic associations; whereas thunderstorms may be regarded as completely dissociated from magnetic associations, and their periodicities are restricted to diurnal and annual variations.

The diurnal maximum of aurora in middle latitudes, or on the equatorial side of this great auroral zone, shaded dark in the woodcut, occurs in the evening; but in Greenland and other regions on its polar side, the maximum occurs in the early morning. Further outside the auroral zone, there are two maxima in the year, one in spring and one in autumn, but at places inside this zone, the two maxima coalesce into a single maximum at the winter solstice. Thus, with an increase of solar heat, diurnal or annual, the auroral zone travels equatorwards, and with increased cold polewards; and it is extremely interesting to note that on the polar side a sun-spot maximum is accompanied with auroral minimum, and the equatorial side with a maximum, thus supporting the idea that a sun-spot maximum period is coincident with a maximum temperature. At the times when the solar heat is greatest evaporation is greatest, the supply of atmospheric electricity consequently more copious, increased tension brings about more speedy neutralisation, the zone of gradual recombination travels towards the equator; and thus auroræ become more frequent in middle latitudes. See the handbooks of Meteorology, numerous articles and notes by Lemström and others in *Nature* (1882-87), and Dr Sophus Tromholt's *Under the Rays of the Aurora Borealis* (1885).

Aurangabad, the name of at least four places in India. The most important of these is in the state of Hyderabad, situated on the Doodna, a tributary of the Godavery. The population is estimated at about 50,000. Its monuments of former grandeur are a palace, now in ruins, built by Aurungzebe, and the mausoleum of Aurungzebe's daughter.

Aurangzebe (*Aurangzeb*, 'Ornament of the Throne') was the most powerful of the Mogul emperors of India, the last who ruled with energy and effect. He was born in 1618, and was the third son of Shah-Jehan. He early cherished or professed profound religious zeal. In 1657 his father, who had previously promoted him to high civil and military offices in the state, in performing the duties of which he greatly distinguished himself, was seized with an illness from which he was not expected to recover. The reins of power were at once seized by his eldest son, Dara, who was unpopular with the orthodox Mohammedans as being too liberal in his theological views. Of the brothers, Shuja was at that time governor of Bengal, Aurungzebe of the Deccan, and Murad of Guzerat. The first immediately took up arms. Aurungzebe's policy was to let the two fight it out, and exhaust each other, and then to play off his third brother against the victor. He conferred with Murad; assured him he had no earthly ambition; that the crown he strove for was a spiritual, and not a temporal one; and that, for affection's sake, and with a view to promote the interests of the true faith, he would support his pretensions to the throne. Murad believed him, and the forces

of the two were joined. Meanwhile, Dara having overcome Shuja's army, directed his forces against his other two brothers; but Aurungzebe's plausibility prevailed over Dara's generals, who deserted, and Dara had to seek safety in flight. By this time, however, Shah-Jehan had somewhat recovered. Aurungzebe professed the utmost loyalty, but secretly gave his son instructions to take possession of Shah-Jehan's palace, which was done, and the aged monarch was made prisoner. Aurungzebe next seized and confined his too confiding brother, Murad; and after a struggle of two or three years' duration, Dara and Shuja also fell into his power, and all three were put to death. The sceptre was now firmly within the grasp of Aurungzebe. He professed not to care for the imperial insignia, but was ultimately induced to receive them in August 1658, assuming the title of Alemgir, 'Conqueror of the World,' and later, that of Mohi-eddin, 'the Reviver of Religion.' In the seventh year of Aurungzebe's reign, his father died, still in confinement.

Aurangzebe's long reign of half a century was distinguished by great outward prosperity, and has been represented as the most brilliant in Indian annals; but the empire was diseased at its heart. Everywhere there was distrust; the emperor, who had established his throne by fraud, was naturally enough distrusted by all. He lacked confidence in his statesmen, who, in their turn, distrusted him and one another. His sons imitated him in his disobedience to his father, and the Hindus, whom he treated with great harshness, excited the Mahrattas against him in the south. Still his great abilities sufficed during his reign not only to preserve his empire intact, but even to enlarge it considerably. Discord between the monarchs of Bijapur and Golconda enabled him to add these two kingdoms to his empire. But though some of the independent Mohammedan princes were subdued, the Hindu states were gathering strength for the overthrow of the Mogul power; and the seeds of decay which had been sown in his reign bore ample fruit in the reign of his son. The later years of Aurungzebe's life were passed in misery. He lived in constant dread that he himself would receive of the measure which he had meted out to others. The decadence of the Mogul empire dates from Aurungzebe's death, which took place at Ahmednagar, in February 1707, in the eighty-ninth year of his age, and forty-ninth of his reign.

Auscultation (Lat. *auscultare*, 'to listen'), a mode of detecting diseases, especially those of the heart and lungs, by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (*immediate auscultation*), or by the aid of a simple sound-conveying instrument, the stethoscope (*mediate auscultation*). By care and attention, the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. Practised by Auenbrugger in the 18th century, auscultation is classed among the most important of discoveries in modern medical science. See DIAGNOSIS, PERCUSSION, RESPIRATION, STETHOSCOPE.

Ausonius, DECIUS MAGNUS, the most conspicuous Roman poet in the 4th century, was born at Burdigala (Bordeaux), about 309 A.D. Early distinguished for his eloquence, he was appointed by Valentinian tutor to his son Gratian; and he afterwards held the offices of quæstor, prefect of Lathium, and consul of Gaul (379 A.D.). On the death of Gratian, Ausonius retired from public life to his estate at Bordeaux, where he occupied himself with literature and rural pursuits until the time of his death (392). It

is most probable that Ausonius was a Christian, though the question has occasioned much controversy, and is perhaps made all the more uncertain by the impurity of his writings. His works include a collection of 150 epigrams, poems on his deceased relatives (*Parentalia*), and on his colleagues (*Commemoratio Professorum Burdigalensium*), epistles in verse and prose, and 20 so-called idyls, of which the tenth, *Mosella*, a description of a journey on the Rhine and Moselle, is perhaps the happiest of all his poems. Ausonius is but a poor poet, though he occasionally displays a certain neatness and grace of expression. The best edition is by Scheidl (Berl. 1883).

Aussee, a market-town in the Salzkammergut of Styria, at the confluence of three mountain-streams, which form the Traun, 22½ miles SE. of Ischl by rail. Situated 2171 feet above the level of the sea, it has mineral springs and baths and pretty villas, and is visited by some 6000 strangers annually. Pop. (1880) 1369, mostly engaged in salt-boiling.

Aussig, a flourishing town in Northern Bohemia, on the left bank of the Elbe, here joined by the Biela, 66 miles NNW. of Prague by rail. It has several large factories, including the principal chemical works in Austria, and carries on an active trade in fruit, timber, stoneware, paraffin, and especially in coal. Its once strong fortifications were destroyed by the Hussites in 1426. The town-church, said to have been built in 826, possesses a Madonna by Carlo Dolce, presented by the father of Raphael Mengs, who was born here. Pop. (1880) 16,524.

Austen, JANE, one of the greater English novelists, was born December 16, 1775, at Steventon, Hampshire, of which parish her father was the rector. Here she spent the first twenty-five years of her peaceful life. She was the youngest of seven children, among whom she had but one sister, and of her brothers two ultimately rose to the rank of admiral in the navy. Her father, who used to augment a slender income by taking pupils, gave her a better education than was common for girls towards the close of the 18th century. Jane learned French and Italian, and had a good acquaintance with English literature, her favourite authors being Richardson, Johnson, Cowper, Crabbe, and, later, Scott. She sang a few old ballads with much sweetness, and was very dexterous with her needle. She grew up tall and remarkably graceful in person, with bright hazel eyes, fine features, rich colour, and beautiful brown curly hair. Her disposition was very sweet and charming, and she was an especial favourite with children, whom she used to delight with her long improvised stories. In her life there is a hint of an affection for a lover who died suddenly, but there is no trace of such a tragedy in her books, which are cheerful and wholesome throughout, free from anything morbid or bitter. In 1801 she went with her family to Bath, and after her father's death in 1805, removed to Southampton, and finally, in 1809, to Chawton near Winchester. She had written stories from her childhood, but it was here that she first gave anything to the world. Four stories were published anonymously during her lifetime—*Sense and Sensibility* in 1811, *Pride and Prejudice* in 1813, *Mansfield Park* in 1814, and *Emma* in 1816. The first two were written before the gifted authoress was more than two-and-twenty years old. Early in 1816 her health began to give way. In the May of 1817 she came for medical advice to Winchester, and here she died two months later, July 18, 1817. She was buried there in the cathedral. *Northanger Abbey* and *Persuasion* were published in 1818, when the authorship of the whole six was first

acknowledged. Jane Austen's novels are the earliest example of the so-called domestic novel in England, nor within their own limits have they been surpassed or even equalled since. No one was ever better acquainted with the limits of her own powers than this marvellous girl, and consequently all her work stands on the same high level of excellence. She speaks of the 'little bit (two inches wide) of ivory on which I work with so fine a brush as produces little effect after so much labour.' The finest critics, with singular unanimity, have praised the delicacy of her touch, and her faultless work has called forth the most unqualified admiration from Southey, Coleridge, Sydney Smith, and Lord Macanlay. Sir Walter Scott wrote of her in his diary: 'That young lady had a talent for describing the involvements, feelings, and characters of ordinary life which is to me the most wonderful I have ever met with. The big bow-wow I can do myself like any one going; but the exquisite touch, which renders commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me.' Her world is the gentry in the England of her time, and she portrays its everyday life with marvellous truthfulness of insight. Her characters are perfectly distinct, and, spite of their old-fashioned dresses and quaint expressions, are more alive to us than many of the persons among whom we actually live. See her Memoir, by her nephew, J. E. Austen Leigh (2d ed. 1871); and her Letters to her sister, written from 1796 to 1816, edited by Lord Brabourne (1884); also Miss Thackeray's fine study in her *Book of Shylocks* (1883).

Austerlitz (Czech *Slavkov*), a small town in Moravia, about 12 miles ESE. of Brunn, stands on the Littawa, and has a population of 3500. Here, on 2d December 1805, Napoleon defeated the combined forces of Russia and Austria, under the command of their respective emperors. The French amounted to 70,000 men; the allied armies to 95,000. In this disastrous battle, known as the 'battle of the three emperors' the Russians lost 21,000 in killed, wounded, and prisoners, the Austrians 6000, and the French 6800.

Austin, the capital of Texas, U.S., stands on the left bank of the Colorado River, and at the junction of several railroads, 166 miles W. by N. of Houston. The river here breaks through a range of hills upon which the city is built. Austin is the seat of a new State Capitol (1887), for the expenses of which three million acres of land have been appropriated, and contains churches for the various denominations, four banks, the State University, which is largely endowed with land grants, and furnishes free tuition to students; several academies, and state asylums for the insane, blind, and deaf and dumb. The city was named after Stephen F. Austin (q.v.). Pop. (1870) 4128; (1880) 11,013; and at the census of 1890, 14,476.

Austin, ALFRED, journalist and poet, born of Catholic parents at Headingley near Leeds, May 30, 1835. He was educated at Stoneyhurst and St Mary's College, Oscott, graduated at the university of London in 1853, and was called to the bar in 1857. He soon turned to literature for a living. His first work was *Randolph* (1854), an anonymous poem full of sympathy for the Poles; but his first important book was *The Season: a Satire* (1861), which was so severely criticised, that its author felt it necessary to reply in *My Satire and its Censors* (1861). *The Human Tragedy* (1862) he soon recalled, but did not issue it in its altered form till 1876. Later volumes of verse are *Interludes* (1862); *Sacroravola*, a tragedy (1881); *Solilo-*

quies in Song (1882); and *At the Gate of the Convent* (1885). As a journalist Austin has long been connected with the *Standard* and *Quarterly Review*, and acted since 1883 as editor of the *National Review*. He stood twice for parliament without success, and has written several political pamphlets, one a brave attempt to answer Mr Gladstone's *Bulgarian Horrors*.

Austin, JOHN, a distinguished writer on jurisprudence, was born at Creeting Mill, Suffolk, March 3, 1790. At the age of sixteen he entered the army, and served in Sicily; but he sold his commission after the peace, and in 1818 was called to the bar. In 1820 he married Miss Sarah Taylor of Norwich (see below), and went to live in Westminster, beside Jeremy Bentham and James Mill. He was compelled by bad health to abandon his practice at the bar about the time when the university of London was founded (1826), and he then received the appointment of professor of Jurisprudence. To fit himself for the chair, he settled in 1827 at Bonn, and returned to England next year well acquainted with the writings of some of the most eminent of the continental jurists. His lectures were well received by a few distinguished men; but the subject was not recognised as a necessary branch of legal study. In the absence of students, Austin in 1832 was reluctantly compelled to resign his appointment. In the same year, he published his *Province of Jurisprudence Determined*, a work at the time little appreciated by the general public; in the estimation of competent judges, however, it placed its author in the highest rank among writers on jurisprudence. It dealt with the relations of ethics to law, and gave an admirable statement of utilitarianism, on which he based his system of morals. In 1833 he was appointed by Lord Brougham a member of the Criminal Law Commission. The post was not much to his taste, as he did not believe that the public received any advantage from such bodies. 'If they would give me £200 a year,' he said, 'for two years, I would shut myself up in a garret, and at the end of that time I would produce a complete map of the whole field of crime, and a draft of a criminal code.' Austin was afterwards appointed a member of a commission to inquire into the grievances of the Maltese. He returned to England in 1838, not in good health, and soon removed with his family to Germany, living at Carlsbad in summer, at Dresden and Berlin in winter. The revolution of 1848 drove him back to England and he then settled at Weybridge, where he died in December 1859, universally respected for the dignity and magnanimity of his character. His lectures on the principles of jurisprudence were prepared for the press by his widow, and published after his death under the title of *Lectures on Jurisprudence* (1861-63). They and the earlier works, edited together by Mr R. Campbell, have passed through several editions.

Austin's great merit consists in his having been the first English writer who attached precise and intelligible meaning to the terms which denote the leading conceptions underlying all systems of jurisprudence. With a very perfect knowledge of the methods of Roman and English law, he displayed genius of the highest order in devising a novel system of classification for the subject-matter of his science. The work he did is incomplete, but it forms a sure foundation to future labourers in the same field. It is universally recognised as an enduring monument of learning and genius, and it entitles its author to take rank as one of the very few Englishmen who have made contributions of importance to the philosophical study of law. Austin said of himself that his

special vocation was that of 'untying knots'—intellectual knots; and so it was. He set himself to the task of exposing the errors hid under the phrases and metaphors current among writers on law, and this he accomplished with such skill and subtlety as to make his works models of close and sound reasoning. See Memoir of Austin prefixed to the *Lectures*, and an article on Austin in Mill's *Dissertations*.—Mrs AUSTIN (née Sarah Taylor), translator, was born at Norwich in 1793, and married John Austin in 1820, the only child of the marriage being Lady Duff Gordon (q.v.). A faithful and devoted wife, she spent many years with her husband abroad, and enjoyed the friendship of many of the most eminent persons in continental society. Mrs Austin translated from the German, Falk's *Characteristics of Goethe* (1833), Carov's *Story without an End* (1834), Ranke's *Popes* (1840) and *History of the Reformation in Germany* (1845); from the French, M. Cousin's *Report on Public Education in Prussia* (1834), and Guizot's *English Revolution* (1850). She herself was author of a pamphlet *On National Education* (1839); of *Germany from 1760 to 1814* (1854); and of *Letters on Girls' Schools and on the Training of Working-women* (1857). From 1861 to 1863 she was engaged in editing her husband's lectures from his manuscripts, a duty she discharged with very great ability. She died at Weybridge, 8th August 1867. —CHARLES AUSTIN, younger brother of John, was born in 1799, and educated at Bury and Jesus College, Cambridge. Called to the bar in 1827, and made a Queen's Counsel in 1841, he, during the railway mania, made an enormous fortune as a parliamentary lawyer, and in 1848 retired from practice. So this first of lawyers and most eloquent of Benthamites, Macaulay's rival as a conversationalist, who to Mill had seemed 'capable of dominating the world,' died, a country squire, at Braundeston Hall, in Suffolk, 21st December 1874.

Austin, STEPHEN F., founder of the State of Texas, was the son of Moses Austin, a pioneer in the same region, and in 1821 conducted a party of settlers to where the city of Austin now stands, thus carrying out a work his father had begun (see TEXAS). In 1833 Austin went to the city of Mexico to secure the admission of his settlement into the Mexican Confederacy, and was imprisoned there till 1835. He died in December 1836.

Austin Friars. See AUGUSTINIANS.

Australasia is a term etymologically equal to *Southern Asia*, but used to indicate Australia and the adjoining islands—Tasmania, New Zealand, Papua or New Guinea, New Caledonia, the New Hebrides, New Ireland, and New Britain. The term would thus exclude the Malay Archipelago, Micronesia and Polynesia proper; but some authors include these great groups of islands also, making the name therefore equivalent to *Oceania*. Popularly, on the other hand, it means the 'Australian Colonies' of Great Britain, including Tasmania, New Zealand, Fiji, &c. The several islands will be found discussed each under its own name; and for the fauna and flora of this region, see GEOGRAPHICAL DISTRIBUTION OF PLANTS AND ANIMALS.

Australia, by far the largest island on the earth's surface, and for extent describable as a continent, lies between 10° 39' and 39° 11½' S. lat., and between 113° 5' and 153° 16' E. long.; having a maximum length, from west to east (from Dirk Hartog Island to Point Arkwright), of about 2400 miles; and a maximum breadth, from north to south (from Cape York to Wilson's Promontory), of 1971 miles; making a total area of 2,954,417 sq. m. (excluding Tasmania, 26,215), about one-fourth less than that of Europe, or nearly twenty-five

times that of Great Britain and Ireland. Its nearest distance to England is about 11,000 miles. It is separated from New Guinea by Torres Strait, 90 miles broad, and from Tasmania by Bass Strait, 140 miles wide; on the N.W., W., and S., it is washed by the Indian Ocean; and on the E., by the South Pacific.

The name Australia in its present signification was first suggested by Captain Flinders, and adopted by the colony about 1817; but the word was used in *Purchas his Pilgrimes* (1625) and other old works for the unknown southern continent.

This island-continent is, above all other continents, exceedingly compact, with an almost unbroken outline on the east and west. Parallel with the east coast, at a distance of about 60 miles, stretches for 1200 miles the Great Barrier Reef, offering but one safe opening for ships. The sea encircling Australia is, on the whole, comparatively shallow. At a distance of from 300 to 500 miles, however, on the east, south, and west coast, a depth of 15,000 feet is attained.

The absence of rivers communicating between the coast and the interior is remarkable. The mountains rising to any great elevation are all on the east side; and there is but one great river, the Murray, collecting into itself (by the Darling and other great tributaries) almost the whole western drainage of that eastern range. The few mountains on the west side of the continent feed but a few short intermittent streams, and a large expanse, between a narrow strip of occupied country on the west coast and the overland telegraph line, appears to be but a slightly relieved barren desert. The lack of natural irrigation over this arid area is further aggravated by the enormous evaporation, which for long periods dries up such rivers as it possesses.

Physical Features.—The mountains of Victoria are noticed in the description of its geology. The eastern highlands of Australia, running parallel with the coast for some 1700 miles, now in a series of ranges, and now in a single chain or series of detached hills, are continued into New South Wales by the Warragong, or Australian Alps, where in Mount Kosciuszko (7308 feet) the continent attains its highest elevation. Thence upland valleys merge northward into the Blue Mountains, which, again, send offshoots towards the Liverpool Range, that, sweeping east and west, curve round the southern edge of the Liverpool Plains. The main chain skirting the east of New England, runs north to the frontiers of Queensland, where it branches into an eastern arm, the Macpherson Range; and a western arm, the Herries Range. Inclosing the western valley of the Brisbane River, and sinking northward to the valley of the Burnett, is the Dividing Range of Queensland, from whose west side slope the Darling Downs. To the north of the Brisbane and Condamine rivers, the highlands expand to their greatest breadth, but contract again to the north of the Fitzroy River into a comparatively narrow chain, which sinks into the depression of the valley of the Burdekin. North of this river, uplands, with an average elevation of 2500 feet, again start north, terminating at 17° S. lat. In South Australia, the Mount Lofty Range skirts the east of St Vincent Gulf, and the Flinders Range the east of Spencer Gulf and Lake Torrens.

Almost the whole of this vast region in the SE. of Australia (the eastern part of South Australia, Victoria, New South Wales, and Queensland) is drained by the Murray and its tributaries, whose arterial system has an area of about half a million miles, an area twice as large as the Austrian empire. The Murray, rising in the Australian Alps, flows between Victoria and New South Wales, then

through South Australia, discharging, after a course of 2345 miles from the source of the Darling, one of its principal tributaries, into Encounter Bay, in the Indian Ocean, shortly after passing through Lake Alexandrina. On its southern or left bank, it receives all the northern streams from the mountains of Victoria, the principal of which are the Goulburn and Loddon. On its northern or right bank, it absorbs all the south-western rivers from the eastern highlands, the principal being the Murrumbidgee (1350 miles long), which also rises in the Australian Alps and collects the waters of the Lachlan; and farther west, the Darling (1160 miles), which has for its tributaries the Barwan, Culgoa, and Warrego. North of the Murray, the two most important rivers are the Fitzroy and the Burdekin in Queensland. The other rivers to the east of the eastern highlands are short and rapid, unfit for navigation. All those hilly and partially river lands consist of grassy park-like uplands, clothed with scattered thin forests of magnificent trees, for the most part evergreen and vertical-leaved, diversified by bush and heath and scrub; all of excellent pasture, intersected by wide valleys of remarkable fertility well adapted for agriculture.

From the head of the Gulf of Carpentaria stretches a tableland westward along the border of the Gulf and the base of Arnhem Land, then SW. along the coast, pierced by the Flinders River, the deep valley of the Alligator, the Roper, and the Victoria; the latter two navigable for a considerable length, and flowing through fertile lands and picturesque scenery.

Western Australia, towards the coast, is in its northern half crossed by ranges of detached mountains, running mostly east and west, and intersected by the fertile valleys of Ashburton, Gascoyne, and Upper Murchison. A large part of its interior consists of a barren tract of salt or mud steppes, almost destitute of fresh water, and extensively overgrown with dreary thickets. In the south, it is pierced by the Upper Swan River and the Blackwood. On the south coast, from King George's Sound to Spencer Gulf, is neither mountain nor river.

To the north of Spencer Gulf is an area of some 1000 sq. m., set with lakes, 'the Lake District' of Australia; Torrens, straight to the north of Spencer Gulf, over 100 miles long, with Eyre to the north of it and much larger, and Gairdner to the west of it. To the east of Eyre are Lakes Blanche and Gregory; and far to the NW., Lake Amadeus. These dead masses of salt water fluctuate greatly in body as the season is dry or rainy, now sheets of water, and now almost grassy plains, set in the dreariest wide-spreading steppes. A comparatively verdant belt of country lies to the east of this district, and runs to the extreme north, as the axis of Australia, along the telegraph line.

Geology.—So far as is known, Australia would seem to be built up chiefly of Palæozoic and Cænozoic or Tertiary formations, though Mesozoic or Secondary deposits have of late also been laid open in various quarters. In Victoria, the Grampians and Pyrenees (with the Ballarat gold-fields to the south) in the SW., the great Dividing Range, and in the NE. the Warragong or Australian Alps; in New South Wales, the Blue Mountains; and in Queensland, the Dividing Range, all consist principally of Silurian strata, broken in upon, however, by intrusive granite, syenite, &c. The same Silurian formation largely pervades South Australia, running in a broad diagonal from the SE. coast, north-westward across the whole province. Though igneous rocks occupy a large area to the south and west of Western Australia, traces of Palæozoic

formations are to be found in the Darling Range. No Carboniferous rocks are known in South and Western Australia. Detached patches of metamorphic rocks occur in Queensland, along the central line of the continent from Ashburton to the Macdonnell Ranges, and in the NW. of Arnhem Land. The older settlements of New South Wales, including the coal-field of the Hunter River, rest on sandstone. Fossiliferous Carboniferous strata, abounding in fine coal, extend over 50,000 sq. m. of Queensland, between 29° and 15° S. lat. The tin-mines of Queensland occur in granite, rising through the Carboniferous rocks. Sandstone and limestone, of Carboniferous or Permian formation, are found in the SE. of Victoria; and the two southern peninsulas of this province consist largely of limestone and carbonaceous deposits of Mesozoic age. The Secondary formations lie principally, however, in Queensland, where Cretaceous beds extend for about 200,000 sq. m., from near the Gulf of Carpentaria to the south of the Darling River. The valley of the Wannon (which runs into the Glenelg River) consists of Mesozoic strata, while the coal deposit of Parramatta to the north of Sydney is likewise of Mesozoic age. The Clarence River, to the north of New South Wales, runs through Triassic strata.

Tertiary deposits, mostly Pliocene, it is supposed, occupy an immense area of Australia, comprehending the desert sandstone, the coral limestone, and a large part of the conglomerates and clays of the gold-diggings. In Western Australia, to the east of the region of igneous rocks, the surface is occupied by desert sandstone, which also stretches north and eastward far into the interior, taking in likewise all South Australia outside the diagonal Silurian bed above mentioned, penetrating into the interior plains of Victoria and New South Wales, and skirting the eastern edge of the Cretaceous strata of Queensland. The earliest discoveries of gold in Australia were made in recent and Tertiary alluvia. The older auriferous drifts are believed to be of Tertiary age. These drifts are found filling up old valleys, and covering the low grounds that spread out from the base of the mountains. They appear to be all of fresh-water origin; vegetable remains (trees, fruits, &c.) occurring not unfrequently in the various beds. During their accumulation volcanic action was rife, and sheets of lava were poured over the surface at successive intervals, so that in sinking shafts through these 'drifts,' the miner sometimes penetrates three or even four separate beds of lava. The gold is usually met with at the very base of the drifts, in the 'gutters' or 'leads,' which are just the bottoms of the old filled-up valleys. It may be added, that although gold is still obtained from such 'drifts,' yet the chief supply now comes from quartz-veins.

Quaternary deposits, forming 'flats' in the gold districts, occur in the Upper Macquarie and Upper Murrumbidgee rivers. These, with clay-deposits in the Liverpool Plains and Darling Downs of New South Wales, have yielded some very interesting fossils throwing light on the past fauna of Australia. A kangaroo, for example, has been found very much larger than any kangaroo of the present times (see *DIPROTODON*); also, a *nototherium* (an animal between the wombat and kangaroo) as large as a rhinoceros. Remains have also been discovered of a bird, named by Professor Owen *dromaeornis*, larger than an ostrich, kindred to the now existing emu and cassowary.

Though there are no active, yet numerous extinct volcanoes are to be found in Australia. In South Australia, in the Gambier group, is a large series of them, which have broken through the horizontal coral beds, and whose craters now present beautiful lakes. In Victoria, a large part of the soil is

volcanic, the debris of volcanoes of all periods down to the Tertiary. Looking from any high eminence in the neighbourhood of Ballarat, you may count extinct volcanoes by the score, some nearly closed up; but others having rims of some miles in circumference, from a few to a hundred feet deep, some rising to a height of 2000 feet above the sea.

Minerals.—Gold is distributed more or less through all the Australian colonies, but its principal seats are in Victoria, Queensland, and New South Wales. Diamonds and other precious stones have also been found in different parts of the continent. The Carboniferous strata of New South Wales, extending over a vast area, are very rich in coal, the coal-fields of that colony being among the most extensive in the world, containing also camel-coal and mineral oils. The whole basin of the Hunter River, with its tributaries, down to Newcastle on the seacoast, abounds in true coal of Palaeozoic age. Coal is found also at Cape Otway, and Western Port in Victoria, but belongs to the Mesozoic formation, and is not of great value. In the south of Queensland is an oolitic coal-field. Palaeozoic coal, of great extent and great prospective value, has been discovered in the central regions of that colony, along the basins of the MacKenzie and Dawson rivers; while near Brisbane and the upper courses of the Darling Downs rivers, almost equally extensive and valuable beds of coal of Mesozoic age have been found. Rich copper-mines have been opened in the Palaeozoic limestones of South Australia. The most important of the earlier mines was the Burra-Burra, 90 miles to the north of Adelaide, discovered 1845; after paying handsome dividends for many years, it has, however, been worked out. Still more extensive deposits of copper ore lie at Wallaroo and Moonta, at the northern end of York Peninsula. Many other copper-mines have been opened in South Australia, but consequent on the serious fall in the price of copper, operations have been suspended in most cases. Silver ore (principally argentite) is worked at Boorook, New South Wales, and mines of apparently inexhaustible wealth were discovered in 1884 at Silverton in the Barrier Ranges. Silver-lead has been worked near Cape Jervis (southern point of peninsula west of Alexandrina Lake), and bis-muth in the mountains of the Mount Lofty Range to the east of Adelaide. Lead and copper exist largely in Western Australia, particularly in the northern districts; but only 465 tons of lead ore, and 120 tons of copper ore were exported in 1885. Iron exists in large masses in Western and South Australia, but in neither of these colonies has coal been found to work it. Very valuable tin-mines have been opened in Queensland, especially in the neighbourhood of the Wild River, as also to the north of New South Wales. Ores of antimony have also been worked in Victoria and New South Wales, and are known to occur in South Australia.

Mining.—Mining is a great and growing industry of Australia, though gold-mining has for some years been steadily declining. Gold is distributed more or less through all the colonies, but the chief mines hitherto opened are in Victoria, where are seven mining districts: Ballarat, Sandhurst, Maryborough, Beechworth, Castlemaine, Ararat, and Gipps Land; the first three being the most productive. The principal gold districts of Queensland are the Peak Downs, Gympie, and Charters Towers. These gold-fields employ a large number of Chinese. The total yield of gold in Australia from 1851 to 1885 was 68,406,511 ounces, valued at £267,991,293. In 1885 the yield of gold was 1,191,135 ounces, valued at £4,195,529. There are extensive coal-fields in New South Wales and

Queensland; the produce in 1885 was 3,088,561 tons. South Australia is known for its rich copper-mines, and there are productive gold-mines in its Northern Territory. Tin-mines of great value have been opened up in Queensland, and silver-mines in New South Wales.

Climate.—In proportion to its size, Australia, lying mostly within the temperate zone, enjoys on the whole an equable climate, although subject to great occasional irregularities; in general, hot and dry, and remarkably salubrious. Within the tropics, it has its rainy season in summer (November to April); south of the tropics, almost exclusively in winter. The principal mountains, both for extent and height, lying to the east or windward side, receive by far the heaviest tribute of moisture brought by the winds from the Pacific; and, as a rule, the amount of rainfall on the east side is in inverse proportion to the distance from the east coast. The west side has far less rain than the east, and there the rainfall is proportionate to the proximity to the west coast. Thus, Sydney appropriates a mean of some 50 inches rain in a year, while Bathurst, 96 miles from the sea, gets only 23 inches; Deniliquin (287 miles removed) 20 inches, and Wentworth (476 miles) but 14 inches. Melbourne and Adelaide in the south receive respectively 25 and 20 inches. The Queensland coast takes from 40 to 80 inches; the west getting proportionately less. The elevated lands of West Australia enjoy about 30 inches rainfall. What moisture is left in the winds after their passage across the highlands, the intense heat rising from the central plains tends to dissipate, instead of allowing it to condense into rain. The parched traveller over those arid deserts looks up again and again into gathering clouds which argue possibility of rain, but never do come to rain. South Australia, Victoria, and in a less degree, New South Wales, are exposed to hot winds from the interior which rapidly raise the temperature of the lands they visit to 115° or higher, and are followed by an equally sudden fall. Melbourne has a mean temperature of 58°; Sydney, 63°; Adelaide, a little higher; Perth, about the same as at Sydney. Captain Sturt found the mean temperature of the interior for three months over 101° F. in the shade, and the drought such as to loosen the screws of his boxes, split his combs into thin laminae, make the leads drop out of his pencils, and his finger-nails become brittle as glass; the season was, however, an exceptional one, and good pastoral country exists within a short distance of what he described as the 'Stony Desert.' The east highlands have a greater proportion of snow than their latitude and height would argue. At 5000 feet of altitude, in certain situations, snow lies all the year round, and many of the higher mountains are covered with snow all the winter. One fall, and one only, of snow is chronicled at Sydney, on 28th June 1836.

The worst feature in the climate of Australia is the total uncertainty and inequality of the rainfall in all parts of the continent, menacing the whole country with almost equally distressing alternations of drought and flood. Droughts sometimes completely wither up vegetation over large tracts of land; to the destruction of many thousands of cattle; that of 1884 was said to have destroyed 10,000,000 sheep. On the coast of New South Wales hardly any rain fell in 1814 and 1815, or in the years 1827, 1828, and 1829. The ordinary drought itself renders almost all the rivers of Australia, with the exception of the Murray proper, merely intermittent; shrunk for months together into straggling water-holes, with or without some connecting thread of stream. As rivers, they really cease to exist for a

longer or shorter period every year. Even the Murray is only navigable at certain seasons of the year. The rainy season, on the other hand, swells these pools into terrific floods, inundating the country, and often most seriously destroying property. The caprices of Australian drought and flood are well illustrated by the metamorphoses of Lake George, 25 miles to the SW. of Gonilburn, and having an elevation of 2260 feet above the sea. In 1824 Lake George was a sheet of water 20 miles long by 8 miles broad; in 1837, a grassy plain; in 1865 it was 17 feet deep; in 1867, two feet deep; in 1876, 20 miles long and 20 feet deep. If only the weather could, within any approximate degree, be calculated on, there are, no doubt, many tracts in the interior which could be utilised. Attention is, however, being directed to irrigation-works on an extensive scale, and the governments of Victoria and South Australia are making arrangements to utilise the waste waters of the River Murray. Water for the use of stock in summer is extensively stored in dams, and large tracts of country with no surface-water have been made available for settlement by sinking wells. In some districts where the conformation is favourable, artesian wells have proved a success.

Botany.—The vegetation of Australia is altogether unique, standing at a long interval from that of all other quarters of the globe; but it is exceedingly abundant in species. These, it is calculated, number about 10,000, of which 8000 have been already determined; considerably more than are to be found in all Europe. A peculiarity of the trees covering its seaboard highlands, is their uniform sombre olive shade, alike on upper and under surface; and the generally vertical direction of their foliage, which thus allows much freer entrance to the blazing summer sun. Another peculiarity of Australian vegetation is the 'scrub'—the 'mullee,' 'mulga,' &c.—which presents anything but a cheering prospect, with perhaps hardly one tree within visible distance, and scarcely a bird to be descried overhead in flight. There is, however, one agreeable scrub formed by the tea-tree, a flowering shrub, a species of *Melaleuca*, abounding in almost all parts of Australia; not so dense as the 'mullee,' and mingled with other flowering plants. Next is the 'heath,' composed of a dwarf shrub, about two feet high, clothing tracts boggy in winter and dusty in summer, mingled with bushes of *Melaleuca* and *Banksia* (or 'native honey-suckle'), all bright coloured and aromatic.

The highlands are rich in wood, such as that of the gum-trees of the genus *Eucalyptus*, growing to a height of 250 feet, with a girth of 12 to 20 feet. In the Panderong Range, 40 miles east of Melbourne, are many trees over 420 feet high; one felled giant measuring as much as 480 feet. Then in the south and west, and even a little into the interior, though less abundantly there, are the valuable shea-oaks, beef-woods, or *Casuarinas*—leafless trees, with rigid drooping branchlets something like our 'horsetails,' their wood of the colour of beef (whence the name), and as good as our oak. The jarrah, or Swan River mahogany of Western Australia, is invaluable for railway sleepers or piles, as it resists the ravages of white ants and marine insects. The grass-tree (*Xanthorrhoea*) shoots up into a rugged stem, varying in height from 2 to 10 feet, and is surmounted by a tuft of wire-like drooping foliage, from the centre of which rises a spike like a bulrush, flowering in winter into white stars. The 'wattles' or acacias, abounding everywhere in the country, and comprising over 300 species, are also a most characteristic feature of Australia, with lovely yellow blossoms,

and generally fragrant. The Australian bush is fragrant all the year. The traveller in the highlands, especially of New South Wales, will not unfrequently light, in some sheltered valley or deep ravine, on a scene of the most luxuriant vegetation, such as that of Illawarra, 50 miles to the south of Sydney, where palms rising to 70 or even 100 feet, Indian figs draped with strange parasites, creepers, ferns, stag-ferns, 'flame-trees,' and vines, and the loftiest trees, are all intermingled into a labyrinth of the most graceful forms and brilliant colours. The 'flame-tree,' with its clusters of red flowers, gives signal of the Illawarra Mountains to ships miles out at sea. The 'fire-tree' of Western Australia, the only non-parasitical plant of the same order as our mistletoe, blazes with orange-coloured blossoms like a tree on fire. The *Stenocarpus Cunninghamii* of Queensland presents one mass 50 feet high of orange-tipped crimson stamens. The 'warratah' of New South Wales shows a single stem of 6 feet supporting a crimson blossom, like a full-grown peony. The alpine vegetation, again, of the higher mountains in Victoria and New South Wales, intermingles the Ranunculus, Genm, Gentiana, Gaultheria, &c., analogous to the alpine plants of Europe, with the purely Australian Oxylobium, Brachycome, Acacia, Hovea, and Bossiaea. Australia affords so wide a variety of climate and soil that most European trees and plants have been successfully introduced. The Scotch thistle has become a serious nuisance, and the governments of the various colonies, as well as private individuals, have expended large sums in the endeavour to exterminate it.

Zoology. The zoology of Australia is even more peculiar than its botany. The mammalia of other lands are totally wanting here, while the marsupials or pouch-bearing mammalia of Australia have but the opossums of America to represent them in any other part of the world. There are in Australia 'no apes, no oxen, antelopes, or deer; no elephants, rhinoceroses, or pigs; no cats, wolves, or bears; none even of the smaller civets or weasels; no hedgehogs or shrews; no hares, squirrels, porcupine, or dormice,' only some peculiar species of rats and mice, and the 'dingo,' a wild dog. The largest of the marsupials is the kangaroo, attaining a height of 5 feet, and a weight of 200 lb. Smaller species are the wallaby, the hare kangaroo, and rat kangaroo. The fruit-eating bat, or flying-fox, is found in New South Wales and Queensland. The shores of Australia are frequented by antarctic-like seals and sea-lions; and on the coast of Queensland is the dugong or sea-cow. Then there are phalangers—nocturnal animals, feeding on leaves, and living in the hollows of trees. In the moonlight stillness of the forest, flying-opossums may be seen gliding through the air. The flying-mouse, 'able to sleep in a good-sized pill-box,' is decidedly Australian. The tarsipes of Western Australia is a honey sucker, no larger than a mouse, with extensible tongue. The koala of the eastern districts is 2 feet long, thick-limbed, and tufted. The wombat, the largest of the marsupials, next to the kangaroo, is 3 feet long, feeds on roots and grass, burrowing deep into the ground, and is nocturnal. The 'native' carnivorous marsupials, variously marked and spotted, but fierce and intractable, dwelling among rocks and in holes, and feeding on small mammal and birds. The ant-eater of Western Australia is of the size of a squirrel, beautiful, white-striped, with long and rather bushy tail. It has fifty-two teeth, a greater number than in any known quadruped and feeds on ants. The platypus, having no teeth nor marsupial pouch, and inhabiting the rivers and lagoons of the south and east of Australia, is 20 inches long, having very short legs, and broad webbed feet.

From its flat head project two flat horny jaws, like the bill of a duck. Australia favours the acclimatization of animal as well as plant life, and the rabbit has proved so prolific as to require special legislation for its suppression. It is estimated that in New South Wales alone 2000 men are employed in the destruction of this rodent, which, if left to itself, desolates wide tracts of country by consuming the herbage. The Victorian legislature has voted £106,302 for rabbit extirpation since 1879, and the total damage sustained by the colony during the ten years 1877-86 is estimated at three millions sterling. The camel has done excellent service in the work of exploration, and is used in outlying districts not only as a beast of burden but for draught purposes. See MARSUPIALS, KANGAROO, ECHIDNA, ORNITHORHYNCHUS, &c.

The birds, if not quite so unique and strange a feature of Australia as are its mammalia, excel those of all other temperate lands for beauty of plumage and fineness of form. Passing over the splendid parrots and cockatoos, we note for their singularity of figure or brilliancy of feather, the regent-bird, rifle-bird, fly-catcher, and lyre-bird. The abundant flora, conjoined with scarcity of fruit, in this isolated continent, develops flower-feeding birds wanting in other lands, such as the Meliphagide or honey-suckers, and the Frigilioside or brush-tongued lories. P. aliar to Australia are, too, the Megapodiide or brush-turkeys, the Menuride or lyre-birds, and the Atrichide or scrub-birds. The Megapodiide do not sit on their eggs, but bury them under mounds of earth or vegetable matter, to be hatched by the sun or fermentation. The emu and cassowary of Australia correspond with the ostrich of Asia and Africa. The Podargi, of enormous mouth—'more-porks,' as they are called, from their singular cry—are a strange and unsightly Australian type. Among song-birds are the piping crow or musical magpie, and the lyre-bird, with its mocking notes. Noteworthy for their curious habits are the satin-birds or bowen-birds, which build their domiciles of twigs and branches, decorated with coloured feathers, bones, and shells, sometimes several feet long, arched over at the top, and which are made the rendezvous of many birds of both sexes. Altogether, Australia has 650 distinct species of birds to muster against Europe's 500. Of reptiles, Australia has no less than 140 different kinds, its largest lizard measuring from 4 to 6 feet. Nor does Australia want for snakes. Though destitute of both the vipers and pit vipers, it makes up for this by the Elapide (a family including the Indian cobras), constituting two-thirds of the snakes of Australia, all poisonous, though only five kinds are fatally so. The black snake of Australia measures from 5 to 8 feet long. Australia abounds, moreover, in insects, beautiful and peculiar, though the butterfly is rare in the temperate zone, becoming numerous towards the tropics. English singing and game birds have been largely introduced. The common sparrow has multiplied to such an extent that it has become a pest, and government has paid considerable sums for the destruction of these birds and their eggs. The ostrich has been successfully acclimatised, and its feathers have already become an article of export.

Aborigines.—Almost as much as its botany and zoology, the human natives of Australia are isolated and peculiar, separated by a wide remove from the Papuans, the Malays, and the Negroes. Of a dark coffee brown complexion, rather than actually black, the Australian stands not much short of the average European in height, but is altogether of much slimmer and feebler build; his legs, in particular, are very lean and destitute of calves (a defect common to dark races). His head

is long and narrow, with a low brow prominent just above the eyes, but receding thence in a very marked degree. The nose, proceeding from a narrow base, broadens outwardly to a somewhat squat end, the eyes on either side of its thin root appearing drawn together. The face bulges into high cheek-bones. The mouth is big and uncouth, the jawbone contracted, the upper jaw projecting over the lower, but with fine white teeth, the chin cut away. The whole head and face, and indeed, the whole person, is covered with a profusion of hair, which, when freed of its usually enclogging oil and dirt, is soft and glossy. His ears are rather pricked forward. The effluvium of his skin, offensive in itself, is exaggerated by the fish-oil he uses to anoint his person. The intellect of the Australian, directed almost exclusively to the means of procuring food, operates wholly within the range of the rudest bodily senses; but inside that elementary sphere, displays no little nimbleness and skill. He is unsurpassed in tracking and running down his prey; and his weapons, though of the most primitive kind, are well adapted to assist him in that purpose, whilst his rude culinary and domestic apparatus manifests equal skill. Nay, he has some exuberance of rude sense, some imitative facility or elementary art in him, as may be observed in the crude figures of sharks, lizards, &c. carved on caves in the N.E., and on the rocks of New South Wales; as also in his language, which, within its very circumscribed sensuous sphere, is fairly expressive and complete; and likewise in the facility with which he learns to chatter foreign languages.

Outside this circle, however, all is blank to the Australian. He has no architecture, almost no weaving, no pottery, and may almost be said to have no religion. His sensations have hardly, if at all, reached the length of sentiments, far less sentimentalities. The man lords it over the woman, who is as much his property as is his 'boomerang' or 'dingo.' The male offspring is, indeed, in considerable estimation; and a father will lament the death of his son for months, or even years. Old men and old or infirm women, on the other hand, are mercilessly abandoned. In summer, they roam about naked, and sense of shame seems almost wholly undeveloped in them. Morality is entirely reduced to the notion of property, wives being one item in a man's chattels, the stealing of which has a definite punishment attached to it. Yet the 'black fellows' are capable of loyal affection and gratitude, and the noble hospitality of the wretched tribes of Cooper's Creek—furnished themselves to the last survivor of Burke's unfortunate expedition should never be forgotten. Without doubt they have often murdered Europeans, but in many cases this was but more or less legitimate reprisal for prior atrocities committed by the convicts or other reckless Europeans. Where caves abound, some of the tribes seek no further, but live in those ready-made tenements. None of them have fixed habitations; at best, only a screen of twigs and bushes, covered with foliage or turf; sometimes, however, logs of wood and turf to serve for a few days' or weeks' shelter till the pursuit of food calls them elsewhere. Thrift is unknown, and the life of the Australian alternates between satiety and semistarvation. In summer he goes naked; in winter he wraps himself in kangaroo skins. To hold his dowak or digging-stick, i.e. binds a girdle of hair about his loins; and for protection against scrubs, he hangs an apron of skins to the girdle. By way of food, he devours the kangaroo, emu, opossum, wombat, lizards, snakes (of which the head is rejected), frogs, larvae, white ants, moths, which are usually roasted, fire being produced by rubbing to-

gether two pieces of stick. The 'gin' wife is bound to keep her lord in vegetable food; roots of wild yam, seeds of acacia, sophora, leaves of the grass-tree, &c.; and if she fails to produce enough, she is liberally treated to manlings and spearings, so that a wife generally appears bruised and gashed all over. The Boomerang (q.v.) is a flat stick three feet long, curved at the centre, and which, when thrown, jerks in zigzag, spiral, or circular fashion, usually returning to the thrower. In addition, they have the throwing-stick, flint-pointed spears, shields, stone-hatchets, digging-sticks, netting-needles, nets of sinews, fibres, or hair, water-skins, and canoes.

There is no government among this people outside that of the family, and no laws except traditional rules about property. In the way of religion they have little save their terror of ghosts and demons, and some superstitious traditional rites applicable to certain epochs in a man's life, more particularly at his burial. At ten years of age a boy is covered with blood; at twelve to fourteen he is circumcised (in the south or north, not in the west or on the Murray); and at twenty he is tattooed or scarred. Felicity after death depends upon proper burial. A man dying in battle, or rotting in the field, becomes an evil spirit. For their curious exogamous marriage customs, see MARRIAGE. Their language is wholly sensuous, their abstraction tending only in the way of arithmetic as far as the number 5, and that itself quite an unusual stretch; it is of polysyllabic formation, and, the accent falling on the penultimate, is not inharmonious. The wider relations of the languages of Australia are still very obscure, but the results already obtained show that there exists between themselves a general grammatical resemblance. The chief languages, besides those spoken on the banks of Lake Macquarie and the Hunter River, are: those of the western regions: that of Encounter Bay, and that of the environs of Adelaide; the Wiradjuri, in the Wellington Valley; the Kamilaroi, in the plain of Liverpool, and on the banks of the rivers Kaniui, Barwan, Bundassa, and Balonne; the Turrubull, on the banks of the river Brisbane; the Dippil, in the north of Moreton Bay, as far as the district of Burneth in Queensland; and the Parnkalla, on the western side of the peninsula of Port Lincoln. Others enumerated are the Pikuumbal, Kingki, and Wodi-wodi. The general phonetic principles in all these idioms are extremely simple. They have five vowels, *a, e, i, o, u*; the diphthongs from these; the consonants *k, t, p, c, m, r, z, l*, pronounced somewhat gutturally; and the semi vowels *g* and *w*. There are no sibilants or aspirates, save in some dialects; *g, d, b* are seldom met and are not clearly articulated. Morphologically the languages of Australia are agglutinative, declension taking place by help of suffixes. The languages of the west are as poor in grammatical forms as Burmese or Siamese; those of the Macquarie Lake recall the structure of the Ugro-Altaic languages; the others, like those of Encounter Bay, offer an analogy to the Basque in their conglomerations of suffixes that almost defy analysis. All these idioms more or less distinguish the three numbers—singular, plural, dual; but the idea of gender seems unknown. The subject, the object, the attribute, the predicate, are only recognised by their position in the phrase, notwithstanding a rich declension by suffixes, which, like Basque, go so far as to differentiate the subject of the intransitive from that of the transitive verb. The verbs have developed a reflexive, a reciprocal, a determinative, and a continuative voice; they have also subjunctive, conditional, and optative forms beyond the ordinary tenses of the indicative (present, imperfect, aorist, future). We find a large number of common roots: the word for 'eye,' for

example, is *mil* in Kamilaroi, Viradurei, Pikumbal, and Kingki; *mai* near the St George River; *miz* in Wodj-wodj; *mizinhata* at Victoria; *mail* near the Cuyges River. The vocabulary is poor enough, and naturally there are no original words expressing abstract ideas. The most scientific studies hitherto made in Australian languages are those of Fr. Müller of Vienna. Like almost all other savages, the native Australians are rapidly vanishing before the advance of civilisation. In the settled districts some of them are usefully employed as shepherds and stockmen, but the majority prefer nomadic habits. The intermittent use of European clothing induces consumption, while the diseases and vices they acquire from Europeans are another potent factor of their destruction. The lowest estimate of their number, prior to European settlement among them, gives over 150,000, the natives still surviving being calculated now at about half that figure. The census of 1881 showed the number to be 31,700, but only natives in the settled districts were included in the returns.

Discovery and Settlement. The precise date of the discovery of Australia is doubtful. It has been asserted that Magellan's followers sighted Western Australia in 1522, and that a Spanish ship passed Torres Strait in 1545. In a French chart of 1542 it figures as 'Jave la Grande.' It is next distinctly referred to in a book by Cornelius Wytfliet (Louvain, 1598), in which it is conjectured to measure one-fifth of the world. The present Torres Strait refers to the presence of Torres there in 1606. Dirk Hartog Island in the west carries us back to Dirk Hartog and the year 1616. Arnhem Peninsula is a reminiscence of the Dutch vessel *Arnhem*, which in 1618 explored the coast of that land. The Dutch ship, *Guldene Zeepaard*, in 1627 sighted a large part of the south coast from Cape Leewards eastwards. The Gulf of Carpentaria was named, probably by Tasman, after Carpentier, governor of the Dutch Indies, 1623-27. In 1688 Australia was first seen by British eyes (so far as now known) in the person of Daupier, who gives name to an archipelago in the NW. Near a century later (1770) we find Captain Cook at this island-continent, on his course of circumnavigation of the globe, exploring the whole eastern coast from Gipps Land on the SE. (in Victoria) to Cape York. This expedition stayed a week in 'Botany' Bay, while Sir Joseph Banks and Dr Solander were collecting some thousand species of the wonders of Australian botany to show at home. Bass Strait, on the south, brings us down twenty years later (1790), when Surgeon Bass was there with Lieutenant Flinders. In 1792 Flinders (who gives name to a range of hills in South Australia, and to a river in the north, discharging into the Gulf of Carpentaria) was surveying Moreton Bay and Hervey Bay; in 1801, Spencer Gulf and the Gulf of St Vincent, as also the coast on the east and north. In 1800 Captain Grant, in 1802 Lieutenant Murray, explored the shores of Victoria; the latter discovering the bay of Port Phillip, at the head of which now stands Melbourne. The exploration of the whole coast of Australia was completed by the *Beagle* (in which Charles Darwin sailed), 1837-43.

The first British settlement having been made in 1788 at Port Jackson (on which Sydney now stands), inland exploration necessarily followed; but for the first twenty-five years was confined inside the Blue Mountains, to a district of some 50 miles inland. In 1813, however, that barrier was passed, and the valley of the Fish River and Bathurst Plains were for the first time brought within the limits of civilisation. Two years later (1815) the Lachlan River (tributary of the Murrumbidgee) was lighted on, and traced 300 miles in a

south-westerly direction to a 'marsh.' Next the Macquarie (tributary of the Darling) was discovered, and followed likewise to a 'marsh'—experiences which suggested the theory of a sea in the interior of Australia. Mr Oxley pushed exploration through New South Wales into Queensland, laying open the Brisbane River. In 1819 Hamilton Hume reached the Murrumbidgee; and in 1824 travelled overland from Sydney to Port Phillip, crossing the Upper Murray *en route*. In 1828 Captain Sturt and he followed the Macquarie to its junction with the Darling. In the following year Sturt traced the Murrumbidgee to its junction with the Murray; then sailed down the Murray to its discharge into Lake Alexandrina, a few miles from its entrance to the sea at Encounter Bay; but not finding its mouth, was obliged to return by river after encountering great hardships. Major Mitchell tracked the Lachlan through the 'marshes,' discovered (1835) the Loddon (tributary of the Murray) and Wimmera (intermittent stream to west of it), crossed the Grampians, descended the Goulburn to the Murray, and altogether surveyed the fairest and richest part of Victoria, 'Australia Felix,' as he admirably named it. In 1839 Mr E. J. Eyre (afterwards governor of Jamaica) discovered Lake Torrens (in South Australia); and in 1840, after exploring its eastern shores, and the Flinders Range to the south, accomplished a successful but most perilous and distressing march of 1209 miles from Adelaide to King George's Sound. In 1844-45 Captain Sturt started from the Darling (130 miles above its confluence with the Murray), travelled 250 miles north-westward, then north to the Grey Ranges, over endless deep red sand-ridges, and a barren mud-plain, through 'Spinifex' (spiny lacerating 'porcupine grass'), to a point within 150 miles of the centre of the continent. In 1843-46 Leichardt explored Queensland from the south borders to the Gulf of Carpentaria. In 1841 he crossed from Fitzroy River to the head of the Gulf of Carpentaria, whence he made his way westward along the north coast as far as Port Essington.

One of the greatest and most successful of all Australian explorations was the passage across the whole continent, from south to north, from Adelaide to a point west of Chambers Bay, in 1862, by J. McDouall Stuart; opening up the Albert River, the Finke River, the Macdonnell Ranges, the Ashburton Ranges, &c., altogether a quite practicable route across the continent through a fairly continuous, if narrow belt of upland and stream, a route utilised in 1872 for a telegraph line, with fixed stations. Nearly contemporaneous with this fortunate expedition was the most tragic one of Burke and Wills. Starting from Melbourne, these two explorers reached Cooper's Creek, the lower course of the Barcoo River. There, leaving the larger portion of their cambrons cavalcade, Burke and Wills pushed on, passing the McKintay Mountains, and reaching the Gulf of Carpentaria, near the mouth of the Flinders, the first passage made across the continent. On their return journey they perished miserably of starvation at Cooper's Creek. McKintay, sent in search of the lost party, traversed the whole continent to Albert River, on the Gulf of Carpentaria, thence eastward to Burdekin River and Port Denison in Queensland. In 1861 F. F. Gregory explored 800 miles of the NW. of Australia, at a distance of some 200 miles from the coast along the upper courses of the De Grey, Ashburton, Fortescue, and Oakover rivers. The west side of Cape York Peninsula was explored by Jardine in 1864.

The telegraph line of 1872, as a base or goal of adventure to or from the west coast, could not but provoke expeditions to draw communi-

eating lines between it and the west coast. Accordingly, in 1872, Ernest Giles started from Chambers Pillar, near the Charlotte Waters telegraph station; but in spite of the most stubborn resolution, reached only 100 miles to the north of Lake Amadeus. In 1873-74, starting 200 miles farther south, he reached half-way across to the west coast. In 1873, however, Colonel Warburton, starting in April from Alice Springs (just north of the tropic) with camels, arrived in December of that year at Oakover River in Western Australia. In 1874 Mr John Forrest, with horses only, passed from Murchison River on the west coast, to the telegraph line a little to the north of Peake Station. In 1875 Giles crossed from the head of St Vincent Gulf to Perth on the west coast, having traversed 2500 miles through a country unfit for settlement, and for 1000 miles had to force his way through interminable scrub. These expeditions seem to demonstrate that much of the interior of Australia, between the west of the overland telegraph line and the east of the narrow hilly border of Western Australia, is little better than desert, either unmitigated sand or dense scrub or porcupine grass.

The first civilised settlement in Australia was made at Botany Bay in 1788 by 1030 persons, mostly convicts. In 1825 Moreton Bay (now Queensland) was settled as a part of New South Wales, attaining in December 1859 the position of a separate colony. The settlement of Western Australia (the Swan River Settlement, as it was then called) dates from 1829. It continued to be a penal settlement from 1851 to 1868. Port Phillip (now Victoria), then a part of New South Wales, was first colonised in 1835, and on 1st July 1851 was constituted an independent colony. The colonisation of South Australia by British emigrants dates from 1836. A large proportion, it may be noticed, of the geographical nomenclature of Australia is Scotch.

The revenue of all the five colonies, which in 1874 was £9,929,596, had grown in 1885 to £19,318,719; and the debt in the same period (largely incurred for public works) increased from £32,865,024 to £101,822,697. Though house-rent is higher than in England, meat, bread, and groceries are all far cheaper, while clothing is not much dearer than at home. Wages, again, are much higher; and there is a constant demand for agriculturists and female domestic servants.

Population.—Especially since the discovery of gold in 1851, Australia has been advancing in all departments of material well-being at a rate surpassing that of any other country on the globe. In 1788 the first settlement at Botany Bay, Sydney, numbered only 1030 persons; in 1835 the European settlers of Australia (including Tasmania) amounted to 80,000. By 1851 the population had risen to 350,000. The discovery in that year of the gold-fields caused a sudden and enormous inrush of immigrants from all parts of the world, and at the present time the inhabitants of the Australian continent count nearly 2,700,000. Between 1830 and 1885 the population of New South Wales grew from 40,000 to nearly a million; between 1836 and 1885 that of Victoria grew from 224 to close on a million; between 1851 and 1885 that of New Zealand from 26,000 to more than half a million. From 1870 to 1880 the immigration to Australia, Tasmania, and New Zealand averaged daily 160 persons, or 58,000 per annum, the increase of population for that decade doubling the rate of the United States. The population to the square mile is— in Victoria, 11.286; in New South Wales, 5.171; in Queensland, .489; in South Australia, .354; in Western Australia, .036; and on the entire continent, .901. The population is, of course, almost all of European origin, the predominating element being British.

In 1881 half the population had been born in the colonies, 800,000 in the United Kingdom, whilst 36,000 were Germans, 5500 Americans, and 3000 French. Chinese labourers, 31,000 in number, are found chiefly in Victoria and Queensland; and there are many Polynesians ('Kanakas'—largely from Fiji) in Queensland.

The largest cities are (with their suburbs) Melbourne, capital of Victoria, 491,378; Sydney, of New South Wales, 386,400; Adelaide, of South Australia, 133,220; Brisbane, capital of Queensland, 48,738; Ballarat, Victoria, 46,033; and Sandhurst, Victoria, 37,238.

Government, Colonial Defence, &c.—Each of the great divisions of Australia forms a separate colony, exercising its own administration, passing its own laws, and levying its own fiscal duties; and all of them enjoying responsible government, with the exception of Western Australia, the constitution of which is 'representative.' In Western Australia the Executive Council is composed of the principal officers of the government, and the governor has power to appoint two unofficial members; the Legislative Council consists of the members of the Executive Council, with the exception of the colonial treasurer, 4 nominees of the governor, and 16 elected members. There is, however, a strong agitation in this province towards a more popular and self-responsible government. The government in each of the other colonies consists of the governor, representing and appointed by the Queen; the Legislative Council, corresponding to the House of Lords; and the Legislative Assembly, corresponding to the House of Commons. The Legislative Councils of New South Wales and of Queensland are nominated purely by the crown; those of Victoria and of South Australia are elected by the inhabitants possessing a certain property qualification. The Legislative Assembly is, in all four colonies, elected by manhood suffrage. Imperial laws are in force in all the colonies, unless superseded by local enactments, and all acts passed by the Local Legislature must receive the assent of the Home Government. All votes are taken by ballot. In Victoria, the members of both houses are paid £300 each per annum, for the three years for which they are elected.

An act to constitute a Federal Council of Australasia, 'for the purpose of dealing with such matters of common Australasian interest, in respect to which united action is desirable, as can be dealt with without unduly interfering with the management of the internal affairs of the several colonies, by their respective legislatures,' passed the Imperial Parliament, and became law on 14th August 1885. Representatives of Fiji, Queensland, Tasmania, Victoria, and Western Australia attended the opening meeting, which was held at Hobart on 25th January 1886. New South Wales, New Zealand, and South Australia decided not to join the Federal Council at present; but there seems every reason to hope that the example of Canada may eventually be followed, with a great United Australasian Dominion as the result. The question of common defence has for some time been engaging the attention of the colonies. On the recommendations of Lieutenant-general Sir William Jervois and the late Sir Peter Scratchley, most of the capitals are now strongly fortified towards the sea; the batteries defending Port Jackson and Hobson's Bay being extensive and well armed. Victoria has a navy of its own, comprising a line-of-battle ship, an ironclad, and a sloop of war. South Australia and Queensland also have gun-boats. At Sydney, the rendezvous and headquarters of the Australian squadron, are stationed permanently several men-of-war. The Colonial Conference of 1887, at which representatives of every British colony assembled

in London to discuss with Her Majesty's ministers questions of imperial concern, marked a new era in the relations of the colonies to the mother-country, and indicated what an impregnable position the partnership now being cemented will give to the empire at no distant date. A proposal was favourably received, and will probably be ratified, that a squadron of nearly double the present strength should be permanently stationed by the British government in Australian waters, the colonies contributing £122,000 per annum towards the cost.

Religion.—There is no state church in Australia, all religious sects being self-supporting. In respect of numbers, Episcopacy is the dominant form of religion, Roman Catholics come second, Presbyterians third, and Methodists fourth.

Education and Literature.—Education has of late been rapidly diffusing itself. In all the colonies, education is either free and compulsory, or the primary schools are all so liberally endowed by the government, as to place elementary instruction within the reach of all classes; while libraries, museums, botanical gardens, schools of art, mechanics' institutes, &c. are multiplying in all the colonies under the liberal patronage of the several governments. The Melbourne Free Library has upwards of 200,000 volumes. There are universities in Melbourne, Sydney, and Adelaide, and also well-equipped astronomical observatories. The names of Baron Von Mueller and of Dr Schomburgk are well known to all botanists. Meteorological science is diligently cultivated; and geographical and other societies are numerous and active.

But in Australia, literary enterprise is mainly absorbed in journalism, as may well be believed when it is mentioned that in the Australasian colonies, including Tasmania and New Zealand, some 800 newspapers, magazines, and periodicals are published, many of them dailies. Melbourne and its suburbs alone issue more than 80 newspapers and magazines. The leading dailies rival English papers in appearance and enterprise; the weeklies, frequently illustrated, are many of them remarkable for cheapness, variety of contents, and 'smart' writing. Satirical periodicals and 'society' papers are well represented.

The current book literature is of course mainly that of the old country; and of the literature produced in the colonies, by far the greater part is the work of men born and bred in Britain. In literature proper, there are three outstanding names—those of Lindsay Gordon, Marcus Clarke, and Henry Kendall. English by birth, and a soldier by profession, Gordon is nevertheless the poet whose verse is oftenest on Australian lips. His work is mainly English in feeling; but some of his poems, notably 'The Sick Stock-rider,' are

rich in local colour. His best-known verses are his *Bush Ballads and Galloping Rhymes*. Kendall is the only Australian born who has secured a permanent place in the affections of Australians; and his poetry is eminently racy of the soil, being a true reflection of Australian scenery and Australian life. His most sustained effort is *Orara*, a narrative poem of adventure and tragedy in the bush. Marcus Clarke, the son of a London barrister, is the most notable Australian prose-writer, his chief work being the novel *For the Term of his Natural Life*. These three writers all died under thirty-seven years of age. J. Brunton Stephens, a graduate of Edinburgh, may after twenty years in Australia be regarded as an Australian poet. Dr Hearn has written in prose on *The Argon Household*, on *The Government of England*, and on *Plutology*. Henry Kingsley was for a few years a colonist; and his descriptions of Australian life, especially in *Geoffrey Hamlyn* and *The Hillyars and the Burtons*, are singularly vivid. Mrs Campbell Pradell has written *Policy and Passion*, and other novels dealing more or less directly with Australian subjects and scenes. And Charles Reade, though without the advantage of Australian experiences, has, in *It's Never too Late to Mend*, given many their most lively ideas of bush-life.

Produce. The chief and most general staple produce of Australia, for which the country is peculiarly adapted, and which constitutes its largest export, is wool. Over all the highland and river-lands of the sea-border—wherever, in fact, there is water—sheep thrive remarkably, except perhaps within the tropics, and the wool is of the finest quality, realising the highest prices in the English market. The produce of wool in Australia in 1884 was 320,076,988 lb., valued at £16,737,353. The cereals of Europe and maize have been introduced into the island-continent with the happiest success, and from 1875 to 1885 the wheat-crop of the five colonies rose from 18,000,000 bushels to 27,000,000 bushels. South Australia is the principal wheat-growing colony as regards the area under cultivation, but is being rapidly overtaken as to yield by the neighbouring colony of Victoria. Potatoes everywhere yield abundantly. The vine is extensively cultivated, and the produce of New South Wales, South Australia, and Victoria was highly commended at the London Exhibition of 1886. Sugar is a very important and increasing product of Queensland, and is also cultivated in New South Wales. Cotton is grown in Queensland. The fruit-trees of Europe and of many of the tropical and subtropical climates also thrive luxuriantly. Tobacco is also grown. The native timber is distinguished for its hardness, durability, and building properties.

The following table gives a comparative view of the agricultural produce of the continent:

HARVEST OF 1885.

	Wheat.	Oats.	Barley.	Maize.	Other Cereals.	Potatoes.	Hay.	Wine made.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Tons.	Tons.	Gallons.
Victoria	9,170,528	4,692,303	1,302,854	181,240	769,629	163,202	442,118	1,008,827
New South Wales	2,733,132	274,107	85,606	4,336,163	14,531	38,695	191,372	555,470
South Australia (1884) ..	14,621,755	68,629	211,207	.....	64,826	23,192	285,839	473,535
Queensland	51,598	1,006	9,826	1,574,294	.....	18,989	30,660	133,298
Western Australia	339,376	23,142	89,581	1,950	.....	1,065	19,677	59,488
Total	26,916,400	5,084,177	1,699,074	6,093,647	848,986	245,163	969,666	2,225,618

In 1891 the wheat crop of Victoria was 13,003,000 bushels; of New South Wales, 3,619,216; and of South Australia, 14,250,904. The chief crop of Queensland, maize, amounted to 2,373,803 quarters in 1890.

Commerce.—The trade of Australia exhibits a remarkable development, the average of trade per inhabitant being about five times that of Europe, and nearly five times that of Canada. The imports of Australia have risen from £35,557,716 in 1874, to £54,031,084 in 1885; the

exports in the same period from £36,724,866 to £43,419,854. It has not escaped the influence of the wave of depression which has affected the whole of the civilised world during recent years, and has also suffered from a succession of bad seasons, and the fall in the value of staple products.

The exports consist principally of wool, frozen meat, preserved meat, tallow, skins of all kinds, hides, wheat, cotton, sugar, and wine. The return for 1885 gives the number of sailing-ships and steamers belonging to the Australian colonies at a total of 1969, with a net tonnage of 246,687 tons. New South Wales, alone of all the divisions of Australia, has (since the governorship of Sir Hercules Robinson, 1872-79) adopted the principle of free-trade. A heavy protective tariff prevails in Victoria, and the example of this colony has been followed by South Australia; but the feeling in the other colonies is less pronounced.

Railways and Telegraphs.—Since 1870, railways and telegraphs have been increasing at a ratio, in relation to population, far exceeding that of the United States. Two main trunk-lines of railway connect the southern seaboard of Victoria with her northern frontier. There is a railway line from Adelaide, *via* Melbourne and Sydney, to Brisbane, the connection having been completed in 1888. Queensland is intersected by three trunk-lines, already running from the east coast for many miles into the west, and their continuation across the whole breadth of the colony, and northwards to the Gulf of Carpentaria, is in assured prospect. She has a line already touching the border of New South Wales. Railway extension is proceeding actively in South Australia also, the transcontinental line having been carried from Adelaide to the Peak. A line of 125 miles is in operation in Western Australia, and other lines are in course of construction. At the end of 1885 the railway lines of Australia already working measured 6134 miles, and 1840 miles were in course of construction. Telegraphi-

cally, the colonies are now all linked together with Tasmania and New Zealand, and with the mother-country *via* Java and India. The telegraphic traffic is enormous, double that of Great Britain in proportion to the population. The telegraph lines at the end of 1885 measured 31,215 miles, embracing 53,437 miles of wire.

Manufactures suitable to the country are rapidly developing. Magnificent lines of steamers maintain frequent communication with Europe and America, between the various colonies, and with the Fiji Islands and New Caledonia. Mails have been delivered in Adelaide in twenty-nine days from London, *via* Brindisi, and the sea-passage between Adelaide and Plymouth may be covered in about thirty-five days. In 1887 mails were delivered at King George's Sound in less than twenty-four days from London. The length of the voyage in sailing-ships ranges generally from seventy to one hundred days. The principal lines are the P. & O., the Orient, the British India (*via* Torres Strait), the Union (San Francisco to New Zealand), the French Messageries Company, and a German service, the last two being subsidised by their respective governments. The Canadian Pacific Railway Company has proposed to carry mails across Canada, thus avoiding the necessity of traversing any but British territory *en route*; but it is doubtful whether any gain in speed will be effected, as the best time *via* San Francisco to Sydney has hitherto been about thirty-nine days.

Statistics.—The following are some of the statistics of the Australian colonies for 1881 and 1891. For comparison we add those of Tasmania and New Zealand.

STATISTICS—1890-91.

COLONIES.	Population in 1881.	Population in 1891.	in 1891.	Public Debt in 1890.	Imports in 1890.	Exports in 1890.	Money in 1890.	Tele. in 1890.	Acres under crop in 1890.
Victoria.....	87,884	802,316	1,110,411	8,340,813	43,610,265	22,951,015	13,296,222	2,688	6,958
New South Wales	309,175	751,468	1,154,207	4,498,620	48,425,333	22,615,004	22,045,937	2,182	23,698
South Australia	903,125	279,865	315,948	2,732,222	20,401,500	8,292,673	8,827,318	1,756	5,623
Queensland.....	608,221	213,535	393,718	3,550,223	28,103,684	5,060,700	8,554,512	2,142	9,850
West Australia...	975,920	29,708	49,782	414,313	1,367,411	874,447	671,813	589	2,921
AUSTRALIA.....	2,944,628	2,136,922	3,033,166	19,536,191	141,910,226	59,772,839	53,365,862	9,357	49,030
Tasmania.....	26,375	113,705	146,067	758,100	6,432,809	1,897,512	1,486,992	330	2,004
New Zealand....	101,235	189,933	626,830	4,208,028	37,343,923*	6,260,525*	9,811,720*	2,012	5,060
GRAND TOTAL...	3,075,238	2,742,560	3,806,663	21,502,319	185,686,949	67,930,876	64,664,571	11,798	56,094
									15,495,797

* The New Zealand figures thus marked are for the year ending 31st March 1891.

See the articles VICTORIA, NEW SOUTH WALES, SOUTH AUSTRALIA, QUEENSLAND, WESTERN AUSTRALIA, &c.; also the *Australian Handbook*, the *Year Book of Australia*, and *Silver's Handbook*; Fr. Muller, *Allgemeine Ethnographie* (2d ed. Vienna, 1879); vol. vi. of Waitz, *Anthropologie der Naturvölker* (Leip. 1871); A. Trollope, *Australia and New Zealand* (1873); Heaton, *Australian Dictionary of Dates* (1879); Dawson, *The Australian Aborigines* (1881); Wallace, *Austrasia* (1880); Bonwick, *First Twenty Years of Australia* (1882); histories by Rusden (1883) and Allen (Melbourne, 1882); Jung, *Australia* (Lond. 1884); Froude's *Oceania* (1886); G. A. Sala's work on Australia (1887); Ridley's *Kamilaroi, and other Australian Languages* (1877); the *Picturesque Atlas of Austrasia* (1888); and the bibliography in *Notes and Queries*, November 1885, p. 436.

Austra'sia, or the East Kingdom, the name given, under the Merovingians, to the eastern possessions of the Franks, embracing Lorraine, Belgium, and the right bank of the Rhine, and having their central point at Metz. At the time of the rise of the Frankish power, these districts were of great importance, as they formed the connection with the German mother-country, and were the most thickly inhabited by Franks. Under Charlemagne's successor, Austrasia merged into

Germany; and Neustria, or West Frank-land, into France.

Austria, the usual name of the great empire now officially called the AUSTRO-HUNGARIAN MONARCHY, is a Latinised form of the German *Oesterreich* (Fr. *Autriche*), meaning 'Eastern Kingdom.' Since 1867, the empire is composed of a union of two states under one emperor, but administratively distinct. The one is Austria, or Cisleithania ('on this side the Leitha,' a tributary of the Danube, on the frontiers of the archduchy of Austria and Hungary); the other, Hungary and the lands of the Hungarian crown, or Transleithania. The relation of the two divisions to one another is discussed below, and at the article HUNGARY. The present article deals with the empire as a whole. The Austrian dominions form geographically a compact territory, with a circumference of about 5350 miles. The total area, 240,456 sq. m., is greater than that of any other European state save Russia, and is nearly twice the area of the United Kingdom. The body of the empire lies in the interior of Europe, though it has about 500 miles of sea-coast on the Adriatic. Austria borders on Italy, Switzerland, Bavaria,

Saxony, Prussia, Russia, Roumania, Servia, and Montenegro. With the sanction of the Berlin Congress of 1878, the small territory of Spizza, on the Montenegrin frontier and formerly Turkish, has been incorporated with Dalmatia. The Turkish provinces of Bosnia and Herzegovina, though occupied and also administered by Austria, cannot strictly be regarded as part of the Austro-Hungarian monarchy.

Area and Population.—The following table shows the area and population of the empire at the census of December 1880 :

I. AUSTRIAN LANDS.—	Area in Sq. Miles.	Population in 1880.
Lower Austria.....	7,654	2,329,021
Upper Austria.....	4,631	760,879
Salzburg.....	2,767	163,566
Styria.....	8,670	1,212,367
Carinthia.....	4,005	348,670
Carniola.....	3,856	481,176
Görz, Gradiska, Istria, and Trieste.....	3,084	650,897
Tyrol and Vorarlberg.....	11,324	911,887
Bohemia.....	19,980	5,557,134
Moravia.....	8,383	2,151,619
Silesia.....	1,987	565,772
Gallcia.....	30,307	5,951,954
Bukowina.....	4,035	569,599
Dalmatia.....	4,940	476,164
Total for Austria.....	115,823	22,130,705
II. LANDS OF THE HUNGARIAN CROWN—		
Hungary and Transylvania.....	107,858	13,700,005
Fiume.....	8	21,363
Croatia and Slavonia (including since 1881 the former Military Frontier).....	16,767	1,889,351
Total for Hungary.....	124,633	15,610,719
Total for the Monarchy.....	240,456	37,741,424

At the census of 1890 the total for Austria was 23,895,413, and for Hungary, 17,335,929. This includes the army and landwehr, amounting in 1891–92, on a peace footing, to 337,419 men; and on a war footing, to 1,872,178. The naval forces consisted in 1891 of 11 armour-clads, 14 cruisers and torpedo ships, 57 torpedo boats, besides station ships, &c. In 1880 Austria had five cities of over 100,000 inhabitants: Vienna, the capital of the empire, 1,103,837 (in 1869, 833,855; in 1875, 1,020,770); Budapest (Pesth), 360,551; Prague, 177,026; Trieste, 144,844; and Lemberg, 109,746. These figures include the garrisons and the suburbs, which, in the case of Trieste, doubled the population of the town proper. Besides these five, there were seven cities with over 50,000, and 42 with over 20,000 inhabitants. After Trieste, the chief harbours are Fiume in Croatia, and Curzola in Dalmatia, with over 20,000 inhabitants; and Zara, Spalatro, and Rovigno, with over 10,000. More than two-thirds of the population are engaged in agriculture; but there is a constantly increasing tendency to concentration in the large towns. The following table of the civil population shows a steady increase since 1818, if we remember that between the census-dates of 1857 and 1869 the empire lost its Lombardo-Venetian territories, with over 5,000,000 inhabitants :

Year.	Population.	Year.	Population.
1818.....	29,769,263	1857.....	37,339,012
1830.....	34,082,469	1869.....	35,634,858
1842.....	35,295,957	1880.....	37,963,346

The Treaty of Berlin of 1878 gave Austria the right of occupying and administering Bosnia and Herzegovina, with the adjoining sanjak (district) of Novi Bazar, which makes it expedient to add the area and population of these Slavonic provinces of the Turkish Empire here :

	Area in Sq. Miles.	Pop. in 1885.
Bosnia.....	16,142	1,148,517
Herzegovina.....	3,515	187,574
Novi Bazar.....	3,522	168,000
Total.....	23,17	1,504,091

Surface.—Three-fourths of Austria is moun-

tainous or hilly, being traversed by three great mountain-chains—the Alps, Carpathians, and Sudetes, whose chief ridges are of primitive rock. The Rhetian and Noric Alps stretch from Switzerland to the Danube, and contain the highest points of the Austrian territories, the Ortler Spitze rising to 12,814 feet. Their height declines gradually towards the east, where the Leitha Hills (3000 feet), overlooking the plain of Vienna, form the transition to the Carpathians. This chain, extending for 880 miles, rises on the left bank of the Danube, near Presburg, and sweeping in a curve, first east, and then southward through Transylvania, again meets the Danube. The central part, or Tatra Mountains, are vast granitic masses, resembling the Alps in character; the highest of these is the Gerlsdorfer Spitze, 8517 feet, and their average elevation is over 6000 feet. Springing from the north-west bend of the Carpathians, the Sudetes run through the north-east of Moravia and Bohemia, in which last the range is known as the Riesengebirge, or Giant Mountains. The boundary between Bohemia and Prussian Silesia passes over the Schneekoppe, the highest peak of these mountains, which is 5330 feet in height. Continuous with this range, and beginning on the left bank of the Elbe, are the Erzgebirge, or Ore Mountains, on the confines of Saxony; and veering round to nearly south-east, the range is further prolonged in the Bohmerwald, between Bohemia and Bavaria. The chief plains of the Austrian empire are the vast lowlands of Hungary (the one in the west is about 4200 sq. m. in extent; the other, which is in the east, and traversed by the Danube and the Theiss, has an area of 21,000 sq. m.), and the plain of Galicia.

From the Gulf of Trieste to the south point of Dalmatia, Austria has a sea-line of about 1000 miles, not counting the coasts of the numerous islands, the largest of which is Veglia, 23 miles by 12. The chief lakes are Lake Balaton (382 sq. m.) and the Neusiedler See (117), both in Hungary. The Alps and Carpathians inclose numerous mountain-lakes. That in the Tatra Mountains lies at an elevation of 6000 feet. The most remarkable of all is the Zirknitz Lake (q.v.) in Illyria. There are extensive swamps or marshes in Hungary.

The leading rivers that have navigable tributaries are: the Danube, which has a course of 850 miles within the Austrian dominions, from Passau, at the mouth of the Inn, to Orsova, on the frontier of Wallachia, its navigable affluents being the Inn, Save, Drave, March, Waag, and the Theiss, which drains nearly half of Hungary; the Vistula, with its tributary the Bug; the Elbe, with the Moldau and Eger; the Dniester and Adige. The Rhine flows for about 25 miles of its course between Austria and Switzerland. The Isonzo, Zernaguna, Kerka, and Narenta flow into the Adriatic.

The canal system of Austria is not extensive. The Vienna and Neustadt Canal, in Lower Austria, has a length of 40 miles; the Bacsar or Franz Canal, between the Danube and Theiss in Hungary, 70 miles; and the Bega Canal, constructed by the Romans, between the Bega and Temes, 83 miles.

The climate of Austria is on the whole very favourable; but from the extent and diversity of surface, it presents great varieties. In the warmest southern region between 42°–46° lat., rice, olives, oranges, and lemons ripen in the better localities; and wine and maize are produced everywhere. In the middle temperate region from 46°–49°, which has the greatest extent and diversity of surface, wine and maize still thrive in perfection. In the northern region, beyond 49°, except in favoured spots, neither wine nor maize succeeds; but grain, fruit, flax, and hemp thrive excellently. The mean

temperature of the year is, at Trieste, 58° F. : at Vienna, 51°; at Lemberg, in Galicia, 44°. The rainfall ranges from 16 inches in the plains of Hungary to more than 60 inches in the neighbourhood of the Alps.

Minerals.—Its mineral wealth is not surpassed in any European country; it is only lately that Russia has exceeded it in the production of gold and silver. Mining has been an important pursuit in Austria for centuries, and has been encouraged and promoted by the government. Bohemia, Hungary, Styria, Carinthia, Salzburg, and Tyrol take the first place in respect of mineral produce. Except platinum, none of the useful metals is wanting. The mines are partly state property, and partly owned by private individuals. The value of their yearly produce is estimated at about £9,06,000. Of this sum coal yields about a half, iron a fifth, salt a tenth, and gold and silver together one-fourteenth. The number of persons employed in mines and smelting-works is about 150,000, a third of whom are in Hungary. Gold is found chiefly in Hungary and Transylvania, and in smaller quantity in Salzburg and Tyrol. The same countries, along with Bohemia, yield silver. Quicksilver is found in Hungary, Transylvania, Styria, and Carinthia. Copper is found in many districts, tin in Bohemia alone. Zinc is got chiefly in Cracow and Carinthia. The most productive lead-mines are in Carinthia. Iron is found in almost every province of the monarchy, though Styria, Carinthia, and Carniola are chief seats. Antimony is confined to Hungary; arsenic, cobalt, sulphur, and graphite are wrought in various parts of the empire.

The useful earths and building-stones are to be had in great profusion; likewise marble, gypsum, chalk, &c. Of precious and semi-precious stones are the Hungarian opal, Bohemian garnets, cornelians, agates, beryl, amethyst, jasper, ruby, sapphire, topaz, &c. Austria is peculiarly rich in salt. Rock-salt exists in immense beds on both sides of the Carpathians, chiefly at Wieliczka (q.v.) and Bochnia in Galicia, and in the county of Marmaros in Hungary, and in Transylvania. The annual production of rock-salt is from three to four million cwt. Salt is also made at state salt-works by evaporating the water of salt-springs. The chief works are those at Ebensee, Aussee, Hallstadt, Ischl, Hallein, and Hall in Tyrol. From two to three million cwt. are thus produced annually. A considerable quantity is also made from sea-water on the coasts of the Adriatic. The sale of salt is in Austria a government monopoly. Of other salts, alum, sulphate of iron, and sulphate of copper are the chief. There are inexhaustible deposits of coal in the monarchy, and of recent years a great deal has been done to develop this particular branch of mining. At present, over 6,000,000 tons are annually raised from the mines, which are spread over all the provinces, but the richest of which are in the mountain-systems of Moravia and Bohemia. Austria has abundance of valuable mineral springs; about 1600 are enumerated, some of them of European reputation, as the sulphur baths of Baden in Lower Austria, the saline waters of Karlsbad, Marienbad, Franzensbad, Teplitz, &c., all in Bohemia.

In 1870-80 the minerals of Austria Proper were worth £8,500,000 a year, and of Hungary about £2,000,000. The most important items are gold, silver, quicksilver, zinc, copper, lead, iron, graphite, and mineral coal. In 1884 the total value of all minerals was £6,011,675; of furnace products, £2,644,432. The number of persons engaged in mining was 91,453, and in metal-works 12,621. For the same year, the minerals of Hungary were valued at £1,876,000, besides the products of the

salt-mines, returned at £1,152,000, while the number of persons employed in the mines and works was 45,719.

Vegetable Products. These, as might be expected from the wide-range in soil and position of the different provinces, are extremely various. Although three-fourths of the surface is mountainous, more than five-sixths is productive, being used either for tillage, meadows, pasture, or forest. Grain of all kinds is cultivated, most abundantly in Hungary and the districts south of it on the Danube; in Bohemia, Moravia, Silesia, and Galicia. Agriculture is not yet far advanced; the Magyar adheres to his primitive husbandry; the German and Slav have adopted more improved methods. Rice is cultivated in the Banat. Potatoes are raised everywhere; and in elevated districts are often the sole subsistence of the inhabitants. Horticulture is carried to great perfection; and the orchards of Bohemia, Austria Proper, Tyrol, and many parts of Hungary, produce a profusion of fruit. Great quantities of cider are made in Upper Austria and Carinthia, and of plum-brandy in Slavonia. In Dalmatia, oranges, lemons, and a few olives are produced.

In the production of wine, Austria is second only to France. With the exception of Galicia, Silesia, and Upper Austria, the vine is cultivated in all the provinces; but Hungary stands first, yielding not only the finest quality of wine, but four-fifths the amount of the whole produce of the empire. Tokay and Carlowitz are amongst the best-known varieties of Hungarian wine. The average produce of the whole empire is estimated at about 200 million gallons, which is mostly consumed by the inhabitants themselves.

Flax and hemp are cultivated almost universally. Tobacco is raised in great quantities, especially in Hungary, which also is first in the cultivation of rape-seed. Bohemia raises hops of the first quality. Nearly a third of the productive surface is covered with wood (66,000 sq. m.), which, besides timber, yields a number of secondary products, as tar, potash, charcoal, bark, cork, &c.

Animals.—Bears are found in the Carpathians, Alps, and Dalmatia; wolves and lynxes in these same districts, and also in the Banat, Croatia, and Slavonia. The marmot, otter, and beaver are also found in Dalmatia. The wild goat lives in the highest, the chamois and white alpine hare in the middle regions of the Alps and Carpathians. There are productive fisheries in the Danube, Theiss, and numerous streams, lakes, and ponds. The sea-fisheries belong to Dalmatia. Leeches, procured chiefly in Hungary and Moravia, form an article of trade. For foreign commerce the most important branch of rural industry is the rearing of silk. Austria produces about a quarter of a million of silk cocoons annually, the Tyrol being the chief centre of this industry.

The breeding of domestic animals is in some districts excellent, in others quite neglected. For horse-breeding there are, besides a number of imperial studs, a great many private establishments, especially in Hungary, for the same purpose. The supply of cattle is not equal to the demand, although great numbers are furnished by Hungary and Galicia. The breeding of sheep, like that of horses, has been a special object of care to the government. The great mass of the wool produced is composed of what are known as middling and inferior sorts. Goats are reared chiefly in Dalmatia, and swine in Hungary. Nearly three-fourths of the population are engaged in husbandry, so that Austria is an agricultural state, though its capabilities have not been fully developed.

Manufactures.—The industry of Austria is not yet adequately developed, but of late years has made great strides. An official estimate of the annual value of the manufactures of the empire in 1880 gave it at over £100,000,000. Bohemia takes the lead in this industry, then follow Austria Proper, Moravia and Silesia, and Hungary. Vienna is the chief seat of manufacture for articles of luxury; Moravia, Silesia, and Bohemia for linen, woollen, and glass wares; Styria and Carinthia, for iron and steel wares. The chief manufactured articles of export are those of silk and wool; the only others of consequence are linen twist, glass wares, and cotton goods. The yearly value of manufactured iron is considerable. The glass wares of Bohemia are of special excellence. The hemp and flax industry is one of the oldest and most important. No branch of industry has risen more rapidly than that of cotton. The manufacture of silk is very extensive. The manufacture of tobacco is a state monopoly, and brings a revenue of nearly 60 million florins; the salt monopoly, 18 millions.

In respect of *commerce*, Austria is most unfavourably situated. High mountains oppose great obstacles on all hands to communication, and separate the producing districts from the only sea that touches the empire; while the chief navigable rivers have their mouths in other countries. Much has been done to remedy these obstacles. Since 1809 a great number of highways have been made. The great Alpine roads over the Stelvio Pass and the Semmering (q.v.) are among the most remarkable constructions of our times. More remarkable still are the railways over the Brenner Pass and the Semmering. The state in 1841 resolved to undertake the construction of railways, and now a tolerably complete network of railway brings all places of importance into easy communication with one another.

River-communication received a great impulse from the introduction of steam. By means of the Danube Steam Navigation Company, formed in 1850, passengers and goods are now conveyed on the Danube between Ulm and Galatz, and on to Constantinople. Since 1856 the management of the navigation of this river has been intrusted to two commissions (see *DANUBE*), but the Austrian traffic is at least somewhat repressed by the fact that the mouth of the river is outside the limits of the empire.

A great number of the political impediments to commerce have been removed or diminished. The customs-boundary that separated Hungary and the adjoining provinces from the rest of the empire was done away in 1851, so that the whole was included in one customs-district, with the exception of Dalmatia, the free ports of Trieste, Fiume, &c.; and measures have been taken to secure that these too shall be gradually incorporated with the rest of the empire. By the tariff of 1852 Austria passed from a prohibitive to a protective system. No article is admitted duty-free; but absolute prohibition is confined to articles of state monopoly (salt, powder, and tobacco). But the foreign commerce of Austria is nothing compared with that between the different provinces.

Commerce.—Between the years 1875 and 1885 the total imports, exclusive of bullion, were smallest in 1876 (£44,532,000), and highest in 1882 (£54,515,000); the exports smallest in 1875 (£45,905,000), and highest in 1882 (£65,158,000). The chief articles of import are vegetable fibres and manufactures, the value of which amounted to £5,772,500 in 1885; the silk imported was valued at £4,475,000; vegetables and fruits, £4,038,800;

fats and oils, £3,013,000; grain and pulse, £2,743,700; colonial wares, £2,298,800; clothing, &c., £2,287,700; animals, £2,247,800; and machinery, £1,884,000. The chief exports are grain, flour, and pulse, which amounted to £8,037,300 in 1885; fuel, £6,585,900; sugar and molasses, £4,221,500; wool and woollens, £3,333,400; and cattle, £2,888,800. Nearly two-thirds of the whole commerce of the empire is carried on with Germany. Its next best markets are Roumania, Russia, Italy, and Servia. The direct trade with Great Britain is comparatively small; the Board of Trade returns recognising only the trade by way of the Austrian seaboard. Between 1875 and 1885 the exports from Austria to Great Britain varied from £855,000 (1876) to £2,337,000 (1883); and the goods imported direct from Great Britain, from £1,041,600 (1877) to £393,000 (1880). The total trade of the free port of Trieste in 1885 was: imports, £13,968,000; exports, £13,669,000.

Railways and Postal Service.—The following table shows the total length, in English miles, of railway lines in the empire open for traffic in 1886:

	Austria.	Hungary.	Total
State lines worked by the state,.....	2,240	2,380	4,620
companies,.....	60		60
Companies' lines worked by the state,....	981	370	1,351
companies,.....	5,042	2,892	7,934
	8,323	5,642	13,965

In Bosnia and Herzegovina there were at the same date three military lines, with a total length of 275 miles. The length of the telegraph lines in the empire in 1885 was upwards of 35,000 English miles. The number of messages carried in 1885 was over 10,000,000. In 1885 there were in Austria proper 4263 post-offices; and in Hungary, 3613. The number of letters and packets passing through the post in 1885 in Austria was 436,507,000; and in Hungary, 129,832,000. These figures are exclusive of newspapers, of which over 132,000,000 were conveyed through the mails in the same year. Bosnia and Herzegovina possess 13 post-offices, 11 telegraph stations, and 58 establishments combining both uses, all under control of the military authorities; but no details are issued as to their employment.

Finance.—There are three distinct budgets, one for the whole empire, another for Austria Proper, and a third for the kingdom of Hungary. Besides their share of the interest on the national debt, Austria has to pay 68·6 and Hungary 31·4 per cent. towards the 'common expenditure of the empire,' an arrangement which renders a deficit here impossible. The budget estimates for the imperial expenses for the year 1886 were £12,566,500. For the administration of Bosnia and Herzegovina in that year, the expenditure was set down at £845,000, and the revenue at £849,000, the cost of the army of occupation being set down at £595,000. —The accounts of *Austria Proper* generally show large deficits, and of recent years a growing expenditure. In 1868 the receipts were £31,733,000; the expenses, £32,289,000; the deficit, £556,000; in 1879 the receipts were £48,438,000; the expenses, £49,009,000; the deficit, £571,000; and in 1886 the revenue was estimated at £50,783,000; the expenditure at £51,662,000—deficit £879,000. The direct taxation amounts to about 8s. per head of the population. The heaviest item of expenditure is the interest and sinking fund of the public debt, which has grown up gradually since the middle of last century, amounting in 1879 to about £35,000,000, and in 1886 to over £332,000,000. To this must be added the government paper-money, £41,000,000, showing a total debt of over £373,000,000. The interest on the public debt amounted in 1886 to £12,525,000, of which

Hungary had to contribute about £3,000,000. Since 1868 Austria and Hungary have contracted all loans separately. The accounts of *Hungary*, with her large special debt, are hardly more promising. In 1877 the revenue was £21,833,000, and the expenditure £23,341,000; in 1886 the estimates were respectively £32,963,000 and £34,368,000, showing an anticipated deficit of £1,405,000. During these ten years the annual income has increased over 50 per cent., but in no single year has the deficit been less than £1,100,000, while in 1879 it exceeded £3,400,000. In the best year, 1885, the direct taxation amounted to 12s. per head. Of the expenditure in 1886, £7,600,000 was appropriated for interest on the special debt of Hungary, which, in the beginning of 1885, amounted to £127,158,000. This debt has grown up rapidly since 1848, and has been contracted largely in the purchase and construction of railways, the expenses of which greatly exceed the receipts.

Inhabitants.—The population is very unequally distributed. The most populous districts are those of the south-west and of the north-west. The Alpine regions and those of the Carpathians are sparsest; and generally the density diminishes towards the east. The population of Austria embraces a greater number of races, distinct in origin and language, than that of any other European country except Russia. The Slavs are the most numerous race, amounting to nearly 42 per cent. of the whole population. They form the bulk of the population of Bohemia, Moravia, Carniola, Dalmatia, Croatia, Slavonia, the Woivodina, the north of Hungary, and Galicia. They are, however, split up into a number of peoples or tribes, differing greatly in language, religion, culture, and manners; so that their seeming preponderance in the empire is thus lost. The chief branches of the Slavic stem are, in the north, the Czechs or Bohemians (the most numerous of all), Ruthenians, and Poles; and in the south, the Slovenians, Croats, Serbs, and Bulgarians. The Germans number above 25 per cent. They are dispersed over the empire, but predominate most in the duchy of Austria, Salzburg, Tyrol, Styria, Carinthia, and the west of Hungary. The Romance peoples (speaking languages derived from that of ancient Rome) amount to fully 9½ per cent., and are divided into western and eastern. The western consist of Italians, inhabiting the south of Tyrol, Istria, and Dalmatia; the Ladins (Latins), occupying some valleys in Tyrol; and the Friulians about Görz, north of Trieste. The eastern Romance people are the Romanians, who are found in Transylvania, Hungary, the Woivodina, and the Bukowina. The Magyars, or Hungarians proper, number over 16 per cent.; they are located chiefly in Hungary and Transylvania; also in the Woivodina, and a few in Croatia and Slavonia. The small remaining portion is composed chiefly of Jews, Armenians, and Gipsies.

The principal languages are German, Hungarian, and Bohemian. The literature of these languages will be found discussed under GERMANY, HUNGARY, BOHEMIA. The Polish (see POLAND) and Ruthenian (q.v.) languages are also spoken by many subjects; for the language of other sections of the population, see BULGARIA, CROATIA, SLAVS.

Religion.—The Roman Catholics in Austria have a large preponderance over other religious bodies. In 1880 there were 25,543,000 Roman Catholics; 4,036,000 Greeks and Armenians united with the Roman Church; 2,928,000 non-united Greeks and Armenians; 3,611,000 Protestants (Lutherans, Calvinists, Unitarians)—of whom over 3,210,000 are in the Hungarian section of the monarchy; 1,643,000

Jews. The Church of Rome has 11 archbishoprics and 40 bishoprics, and an army of secular priests. At the accession of Joseph II. there were 2024 convents; but at the end of the French war (1816) they had been reduced to 800. There are at present nearly 300 abbeys and above 500 convents in the empire.

Education.—The following figures show how amply the government has provided for the educational wants of the people. In 1878 there were in the empire 32,273 *Volks-schulen*, 143 training schools for teachers, 271 gymnasiums, 166 secondary schools, 13 schools of law, 91 theological colleges, and 752 other professional and technical institutions, including naval and military academies, and schools of science, art, music, commerce, mining, and agriculture. In 1885 the elementary schools of the dual empire had 4,581,600 pupils, of whom 2,780,000 were in the Austrian division. In 4195 schools Czech was the language of instruction. In 1887 the Austrian universities (named below) had 14,540 students; the Hungarian ones, 4169. Vienna has itself 4000 students.

Education in Austria has been under the care of a minister of Public Worship and Instruction since 1849; and in 1867 a similar minister was appointed for Hungary. Instruction, whether high or low, is mostly gratuitous, or is given at a trifling cost, being provided from general or local public funds. The primary schools in Austria are to a very large extent in the hands of the clergy, and there the Roman Catholic religion forms an essential part of the instruction. The number of elementary schools has increased greatly in recent times. The law enforces compulsory attendance at the '*Volks-schulen*,' or national schools, of all children between the ages of six and twelve; parents are liable to be punished for neglecting to send them, and only where Jews or Protestants have established elementary schools of their own can they keep their children from the national institutions. There is a very great difference between the German provinces and the Slavonic ones in respect of education. In Vorarlberg 82 per cent. of the inhabitants read and write; in Bukowina (1880) not quite 10 per cent. There are eleven universities in the empire, at Vienna, Prague, Grätz, Briinn, Innsbruck, Pesth (Budapest), Cracow, Klausenburg, Lemberg, and Czernowitz. Vienna, Grätz, and Innsbruck rank as German universities; Prague has since 1880 a Bohemian and a German university. There are a large number of establishments where the pupils are received young, and educated and trained for the army and navy, for the counting-house, for the mine and the farm, as *acconcheurs*, &c. There are also a large number of institutes for the promotion of science and art. The chief libraries are the Imperial and University libraries of Vienna. There are in the whole monarchy about 800 newspapers and other periodical prints, of which fully the half are in German. Such of them as are political are fettered by conditions which render them quite worthless as organs of public opinion.

Army and Navy.—Military service is compulsory on all citizens capable of bearing arms. The term of service is twelve years—three in the standing army, seven in the reserve, and two in the *Landwehr*. Since 1869 the military forces of the empire have been divided into the standing army and reserve; the *Landwehr* (q.v.); and the *Ersatz-reserve*, a class of conscripts intended to fill up the regiments in time of war, but enjoying a permanent furlough during peace. A law passed in 1886 added also the *Landsturm*, made up of volunteers not belonging to any of the other forces. The army has on a peace footing 302,000 men, and on a war footing 1,100,000; under the

law of 1886, it is expected this will be increased to 2,000,000 or more. (See the paragraph on Austria in the article ARMY.) The navy is recruited partly by a *l  vy* from the seafaring population, and partly by voluntary enlistment. The term of service extends for ten years, including three in active service and seven in the reserve. The chief port for the navy is Pola, and its principal arsenal Trieste. In 1887 the navy comprised 10 ironclads, 7 cruisers, 6 torpedo vessels, 34 torpedo boats, and 16 vessels for coast defence. These are manned by about 10,000 men, raised to 14,000 in time of war.

Government.—Austria is a monarchy hereditary in the House of Hapsburg-Lorraine. In the case of the reigning family dying out, the states of Bohemia and of Hungary have the right of choosing a new king; but for the other crownlands, the last sovereign appoints his own successor. The reigning house must profess the Roman Catholic faith.

Till 1848 Hungary and Transylvania had a constitution limiting the monarchy, which was absolute for the rest of the empire; though the several provinces had each its consultative council composed of clergy, nobles, and burghers. After the Revolution of 1848, and the subsequent reaction, all marks of independence of the separate provinces disappeared. The imperial constitution granted March 4, 1849, as well as the provincial constitutions that followed, were abolished, and government was organised in the most absolute form by the imperial letters patent of December 31, 1851. The different provinces of the monarchy were divided into circles, the chiefs of which were nominated by the central authority. All the machinery of a free and constitutional government was set aside. In order to support itself in this course, the government had to seek aid from the Catholic Church, with which it established the concordat of 1855. By this agreement with Rome, Catholicism became a privileged religion, with control of education and of the censorship of books. Thus the reaction was complete. Of the reforms of 1848, there remained only one of importance, the abolition of serfdom.

Since the year 1867 Austria has been reconstructed as a dual empire, consisting of a German or 'Cisleithan' monarchy, and a Magyar or 'Transleithan' kingdom. Each of the two countries has its own laws, parliament, ministers, and government, and deals with the affairs exclusively relating to itself. The ministers for affairs common to the whole empire (foreign affairs, finance, army) are not responsible to either parliament, but to the Delegations. The connecting link between the two portions of the empire is constituted by a body known as the Delegations. These form a parliament of 120 members: the one half is chosen by the legislature of Germanic Austria, which is represented by it, and the other half represents Hungary. The person of the sovereign is another link between the two members of the empire. The Magyars claim, under certain conditions, the right of freely electing their monarch. The Delegations have control of all matters affecting the common interests of the two countries, especially foreign affairs, war, and finance; and the ministries of these three departments are responsible for the discharge of their official functions to the Delegations, a committee of which sits permanently. The acts of the Delegations require to be confirmed by the representative assemblies of their respective countries; and in this manner it is attempted to leave the self-government of both Austria Proper and Hungary free. These arrangements were determined by the famous *Ausgleich* or agreement with Hungary in 1867. The govern-

ment has frequently much difficulty in fixing its political and commercial policy so as to satisfy two parliaments with equal powers of control and different views; but the great influence of the crown generally suffices to prevent a dead-lock.

The administration of Austria Proper is divided among seven ministries—Public Education and Ecclesiastical Affairs, Agriculture, Finance, Interior, National Defence, Commerce, and Justice. Formerly the ministry was merely the collective organ of the emperor, and was responsible to him alone. But a bill passed by the Reichsrath in 1867, and sanctioned by the emperor, renders it responsible to parliament.

The Reichsrath consists of an upper and a lower house. The upper house is composed of the princes of the imperial family who are of age, of upwards of 50 nobles, 10 archbishops, 7 bishops, and 105 life-members nominated by the emperor. The lower house numbers 353 members, elected by voters of each country, arranged in the four classes of great proprietors, towns, commerce, and rural districts. In the three first classes the voting is direct; in the last, indirect. To give validity to bills passed by the Reichsrath, the consent of both chambers is required, as well as the sanction of the emperor. Thus the government of Austria is both representative and constitutional.

The executive of Hungary is carried on in the name of 'the king' by a responsible ministry. See HUNGARY.

History.—The empire of Austria arose from the smallest beginnings at the end of the 8th century. In 796 a Margraviate, called the Eastern Mark (i.e. 'March' or frontier-land; see MARK, MARQUIS), was founded as an outpost of the empire of Charlemagne, in the country between the Enns and the Raab. The name *Oesterreich* appears first in 996. In 1156 the mark was raised to a duchy; and after coming into the possession of the House of Hapsburg in 1282, it rapidly rose to a powerful state. The princes of that House extended their dominion by marriage, by purchase, and otherwise, over a number of other states, and from 1438 held almost without interruption the throne of the German empire. By the acquisition (1526) of the crowns of Bohemia and Hungary, Austria rose to the rank of a European monarchy. In 1804 Francis declared himself hereditary Emperor of Austria, and two years afterwards resigned the title of Emperor of Germany and King of the Romans.

In the earliest times, what is now the duchy of Austria was inhabited by the Taurisci, a Celtic people; but their name subsequently disappeared before that of the Norici. After the conquest of the Norici by the Romans (14 B.C.), the country to the north of the Danube belonged to the kingdom of the Marcomanni; on the south of the river lay the Roman provinces of Noricum and Pannonia, in which last was the municipal city of Vindobona (Vienna). Tyrol formed part of Rhetia. All these boundaries were swept away by the irruption of the northern peoples; and the regions in question were occupied in succession, during the 5th and 6th centuries, by Boii, Vandals, Goths, Huns, Lombards, and Avars. After the Lombards had settled in Italy, the Enns, about 568, became the boundary between the Bavarians and the Avars. In 796 the armies of Charlemagne destroyed the Avars, and as a bulwark of his empire in that quarter, established the East Mark, which formed the nucleus of the Austrian empire, just as the mark of Brandenburg grew into the modern Prussia. The East Mark was at first of small and varying dimensions. Early in the 10th century it was almost effaced by the Hungarians, then newly arrived in their present seats; but Otto I. having

defeated them in the battle of Augsburg (955), reunited the country to Germany.

In 983 Otto appointed Leopold of Babenberg margrave of the reconquered province, whose dynasty ruled Austria for 260 years. Under Henry Jasomirgott (1141-77), the Mark above the Enns was annexed to the Lower Mark, the united province raised to a duchy, and important privileges conferred on the newly-named duke and his heirs. This Henry Jasomirgott took part in the second crusade; and he was one of the founders of Vienna. Under his successors, large additions (Styria, Carinthia) were made to the possessions of the House. Leopold VI. undertook numerous expeditions against the Hungarians and the Mussulmans, and is reckoned the best of the Babenberg princes. The line became extinct with his successor, Frederick, who fell in battle with the Magyars (1246).

Then followed an interregnum from 1246 to 1282. The Emperor Frederick II. at first treated the duchy as a lapsed fief of the empire; but in the distracted condition of affairs, the Estates of Austria and Styria chose Ottokar of Bohemia as duke, who made good his nomination about 1260. Ottokar, refusing to acknowledge Rudolf of Hapsburg as emperor, was defeated, and lost his life and possessions, in the great battle of the Marchfeld (1278); and the emperor elect, as head of the Holy Roman Empire, shortly afterwards (1282) bestowed the vacant fiefs of Austria, Styria, and Carinthia on his sons Rudolf and Albert. These duchies were afterwards united in the possession of Albert.

From the year 1282 the House of Hapsburg has ruled Austria, and has been associated with all its subsequent greatness and vicissitudes. Albert, the first duke of the line, had many difficulties to contend with, especially among his subjects, who insisted on their old privileges, but he energetically asserted his authority. He was murdered in 1308 by his own nephew. Of his five sons, Frederick was chosen (1314) by a party to the imperial throne, but was defeated (1322) by his rival, Louis of Bavaria. Duke Leopold was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons that had thrown off their allegiance to Albert I. In 1330 Albert I., another of the sons of the first Albert, succeeded to the duchy, and considerably increased the possessions of the House. After his death (1358), two of his sons, Rudolf and Albert III., successively followed in the duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach, in seeking to regain the Hapsburg possessions in Switzerland. The posterity of Albert III. and Leopold respectively formed the two lines of Austria and Styria. During Albert III.'s reign, Tyrol and other districts were ceded to Austria. After his death (1395) the dukedom was held by his son, Albert IV. Albert V., who succeeded his father in 1404, by marrying the daughter of the Emperor Sigismund, succeeded (1438) to the thrones of Hungary and Bohemia, and was at the same time raised to the dignity of German emperor, as Albert II. After his death in 1439, Bohemia and Hungary were lost to the House of Austria; but the imperial dignity was henceforth associated with it. With Ladislaw, Albert's son, the Austrian line of the House closed (1457), and their possessions went to the Styrian line. Of this line was the Emperor Frederick III., who raised the dignity of his House by making Austria an archduchy. Through the death of the other members of the House, Frederick succeeded in uniting the domains of Austria, curtailed, however, by the loss of the family possessions in Switzerland. He was succeeded in 1493 by his son Maximilian I.

The rise of Austria and of the House of Hapsburg to historical eminence may be said to date from the reign of Maximilian I. (1493-1519). By marrying Mary, daughter of Charles the Bold (1477), he acquired possession of the Netherlands. Through the marriage of their son Philip with Joanna of Spain, the Houses of Austria and Spain were united. As Philip died in 1506, his elder son, the celebrated Charles V., became heir to the united monarchies, and was elected emperor of Germany in 1519. Thus, by a succession of fortunate marriages, the House of Hapsburg became the most powerful dynasty in the world. This stage, at least, of Austrian history entirely justifies the well-known line:

*Bella gerant alii; tu felix Austria, nube.**

Charles V., however, resigned all his German territories to his younger brother, Ferdinand I., who was thus the continuation of the Austrian branch of the line. Under Ferdinand the power of Austria greatly increased, for circumstances were now to put her into the dangerous but honourable and finally powerful position of bulwark of Christian Europe against the Turks. Ferdinand had married the sister of Louis, king of Bohemia and Hungary, and when Louis fell in the disastrous battle of Mohacz (1526), he claimed both these kingdoms. His claim to Hungary was contested by John Zapolya, who secured the aid of the great Turkish Sultan Soliman, the victor of Mohacz. Soliman accordingly invaded Hungary with a powerful army, and crushing all resistance, marched as far as Vienna, but failed in his siege of the capital (1529). Only a small part of Upper Hungary remained with Ferdinand, the rest of the country being subject to Turkey till near the close of the 17th century. Even the portion of Hungary that he held was a precarious possession, for which in 1547 he promised to pay an annual tribute of 30,000 ducats. On the abdication of Charles V. (1556), Ferdinand succeeded to the imperial dignity; he died in 1564, with the reputation of a good ruler, one strongly conservative of everything established, though he introduced the Jesuits. During his reign, however, the Reformation had made wonderful progress in the Austrian states.

In the partition of the inheritance that took place among Ferdinand's three sons, the eldest, Maximilian II., received the imperial crown along with Austria, Hungary, and Bohemia; the second, Ferdinand, Tyrol and Upper Austria; the third, Charles, got Styria, Carinthia, &c. Maximilian was more fortunate in Hungary than his father. The death of Soliman before Szigeth (1566) led to a truce; Maximilian had his eldest son, Rudolf, crowned king of Hungary in 1572, and shortly after, of Bohemia, and also chosen king of the Romans. But his attempt to bring the crown of Poland into his House failed. Maximilian II. was fond of peace, tolerant in religion, and a just ruler. He died in 1576; and of his five sons, the eldest, Rudolf II., became emperor. Under him, the possessions of the Archduke Ferdinand of Tyrol, who had married Philippine Welser (q.v.), the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolf II. was negligent, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. In 1608, he was obliged to cede Hungary, and, in 1611, Bohemia and Austria, to his brother Matthias (q.v.). Matthias, who became emperor in 1612, ceded Bohemia and Hungary to his cousin Ferdinand, son of the

* Let others war; do thou, Austria, make fortunate marriages.

Archduke Charles of Styria, third son of Maximilian II. Matthias lived to see the outbreak of the Thirty Years' War (q.v.), and died in 1619.

Bohemia refused to acknowledge his successor, Ferdinand II. (q.v.), to whom all the Austrian possessions had again reverted, and chose the Elector Palatine, Frederick V., the head of the Protestant Union, as king. This election gave the signal for the Thirty Years' War (q.v.), in which the House of Austria took the lead, both as the champion of Catholicism, and the head of a power which aimed at universal domination in Germany and in the Christian world. The battle of Prague (1620) subjected Bohemia to Ferdinand, who formally set about rooting out Protestantism in that country and in Moravia. The emperor also succeeded in extorting acknowledgment of his sovereignty from the States of Austria; and here, too, Protestantism, which had made great progress since the time of Luther, was mercilessly suppressed. Under Ferdinand's successor, the Emperor Ferdinand III. (1637-1657), Austria continued to be a theatre of war; and at the peace of Westphalia (1648), had to cede Alsace to France. Ferdinand III.'s son and successor, Leopold I., provoked the Hungarians to rebellion by his severity. Tekeli (q.v.) received aid from the Porte, and Kara Mustapha besieged Vienna (1683), which was rescued only by an army of Poles and Germans under John Sobieski hastening to its assistance. After this great deliverance of Vienna, the Turkish power continually declined. In 1686 they lost Buda, after having occupied it for nearly 150 years. Repeated defeats from the Austrian troops under Louis of Baden and the famous Prince Eugene compelled them to submit to the treaty of Carlowitz (1699), by which they were almost entirely cleared out of Hungary, Transylvania, and Croatia, and the Hapsburg dominions nearly advanced to their present frontiers. The struggle between Leopold and Louis XIV. of France for the heirship to the king of Spain, led to the war of the Spanish Succession (q.v.), during which Leopold died in 1705. He was of sluggish phlegmatic character, and wholly under the influence of the Jesuits.

His eldest son and successor, the enlightened Joseph I. (q.v.), continued the war. He died childless in 1711, and was succeeded by his brother, Charles VI. The peace of Rastadt, which concluded the war of the Spanish Succession in 1714, secured to Austria the Netherlands, Milan, Mantua, Naples, and Sicily. In the following years, its power on the Lower Danube was extended by the great victories of Prince Eugene, who completely defeated the Turks, took Belgrade, and compelled them to accept the disadvantageous peace of Passarowitz (1718). But these advantages were lost in a subsequent war, concluded by the peace of Belgrade (1739), when that fortress and other conquests of Eugene were restored to Turkey.

With the death of Charles VI., in 1740, the male line of the Hapsburgs became extinct, and his daughter, Maria Theresa, who was married to the Duke of Lorraine, assumed the government. For many years it had been the aim of Charles to secure the adhesion of the European powers to the Pragmatic Sanction, by which the possessions of the Austrian crown should pass to Maria Theresa. Those powers during his lifetime had promised to second his wishes, but he was no sooner in his grave than nearly all of them sought to profit by the accession of a female sovereign. A great war arose, in which England alone sided with Maria. Frederick II. of Prussia conquered Silesia. The Elector of Bavaria was crowned king of Bohemia, and elected emperor as Charles VII. in 1742. The Hungarians, however, stood by their heroic queen,

who was soon able to wage a fairly successful war against her numerous foes. At the general peace of Aix-la-Chapelle in 1748, the power of Austria remained unbroken, except that it had been obliged to give up Silesia to Prussia, and a few districts of Northern Italy to her rivals there. At the death of Charles VII. in 1745, the husband of Maria Theresa was elected emperor of Germany as Francis I. The empress-queen, however, was not content with the loss of Silesia, and in 1756 entered into alliance with France, Russia, Saxony, and Sweden against Frederick. The result of the Seven Years' War (q.v.), which now ensued, was to confirm Prussia in the possession of Silesia. At Francis's death (1765), his son, Joseph II., became German emperor, and joint-regent with his mother of the hereditary states. Collateral branches of the House of Austria sprang from the younger sons of Maria Theresa, the Archduke Leopold in Tuscany, and the Archduke Ferdinand, who married the heiress of Este (see *MODENA*). In the first partition of Poland (1772), Austria acquired Galicia and Lodomeria, and the Bukovina was ceded by the Porte in 1777. At the death of the empress in 1780, the monarchy had an extent of 234,000 sq. m., with a pop. of 24 millions, and a debt of 160 million florins. The administration of Maria Theresa was distinguished by unwonted unity and vigour, both in home and foreign affairs.

Her successor, Joseph II., was an active reformer in the spirit of the enlightened despotism of the times; though often rash and violent in his mode of proceeding. He introduced economy into every department, relaxed the censorship of the press, granted liberties and rights to Protestants, abolished a great number of monasteries, and revised the school system. His protective system of duties, though exhibiting his narrowness as a statesman, gave a start to native manufactures. But his reforming zeal and passion for uniformity excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the government by his brother, the Grand-duke of Tuscany—as German emperor, Leopold II.—who succeeded in pacifying the Netherlands and Hungary. The fate of his sister, Marie Antoinette, and her husband, Louis XVI., led Leopold to an alliance with Prussia against France; but he died in 1792 before the war broke out. War was declared by France on his son, Francis II., the same year (see *FRANCE*). By the treaty of Campo Formio (q.v.), 1797, Austria lost Lombardy and the Netherlands, receiving in lieu the Venetian territory. In 1795, at the second partition of Poland, it had been augmented by West Galicia. Francis, in alliance with Russia, renewed the war with France in 1799, which was ended by the peace of Lunéville. It is needless to follow all the alterations of boundary that the Austrian dominions underwent during these wars. The most serious was at the peace of Vienna (1809), which cost Austria 42,000 sq. m. of territory, and 11 million florins of her revenue. It was in 1804, when Napoleon had been proclaimed emperor of France, that Francis declared himself hereditary emperor of Austria as Francis I. On the establishment of the Confederation of the Rhine, he laid down the dignity of German emperor, which his family had held for nearly four hundred years.

The humiliating peace of Vienna was followed (1809) by the marriage of Napoleon with the Archduchess Maria Louisa; and in 1812 Austria figured as the ally of Napoleon in his great campaign against Russia, but she did not give much active assistance. In August of the following year Austria joined the grand alliance against France;

and the Austrian general, Schwarzenberg, was intrusted with the chief command of the allied forces, which at the battle of Leipzig and in the campaign of 1814 broke the power of Napoleon. The sacrifices and great services rendered by Austria in the gigantic struggle received full consideration at the treaty of Vienna (1815). As recompense for the loss of the Netherlands she received Venice and Dalmatia, which afforded an outlet for her foreign trade.

After that time, Austria exerted a powerful influence in European politics generally, and more especially in the German Confederation, of which her emperor was president; and that influence was uniformly hostile to constitutionalism (see METTERNICH). The death of Francis I. in 1835 made little alteration in the policy of Austria; Ferdinand I. trod in his father's footsteps. The political alliance with Russia and Prussia was drawn closer by a personal conference of the emperor with Nicholas I. and Frederick-William III. at Teplitz in 1835. The wonted calm was interrupted in 1840 by the war against Ibrahim Pasha in Syria, in which Austria took part in union with England.

But during this long peace, the internal condition of the empire was coming to a crisis. The stifling bureaucratic system of government and police supervision had produced only irritation and discontent, and was powerless to compress the fermentation. A Polish insurrection in 1846 led to the incorporation of Cracow with the monarchy. But the opposition to Austrian rule in Italy, Hungary, and Bohemia became uncontrollable; even in Lower Austria the Estates were among the foremost to urge reform in the direction of constitutionalism. In Austria, the revolutionary period of 1848-49 was one of exceptional severity, the movement for constitutional freedom being complicated by the revival of the national spirit in Hungary, Italy, and Bohemia. The time was everywhere ripe for revolt, when the fall of Louis-Philippe (February 24, 1848) gave the signal for the outbreak of the revolutionary elements all over Europe. Nowhere was the spirit of change stronger than in Vienna, which for many months became a scene of confusion. A period of addresses and petitions for liberal reform was, in March, followed by a popular movement in the capital, to which the government and military, after a feeble resistance, succumbed. The downfall of the old system was marked by the flight of Metternich to England, by the arming of the citizens, by the granting of the freedom of the press, and other popular measures. At the same time, the opposition in Hungary had carried their demand for an independent ministry responsible to a national diet, and the emperor was not in a position to withstand it. The 22d of March saw the insurrection break out at Milan; and Radetzky, the military commander, forced to retire on Verona. Venice rose at the same time, and drove out the Austrians. The Austrian power and system of government had in fact broken down.

The central power at Vienna was in a state of collapse, and the authority passed into the hands of the national guards and the students' legion (the *Auda*). Further troubles in the capital led to the flight of the court to Innsbruck. A Slavie insurrection broke out in Prague after Easter, which, however, was repressed with bloody severity by Prince Windischgrätz. While the emperor was lingering at Innsbruck, saying Vienna in the power of the populace, and the Hungarians were pursuing an independent course, it was in Italy that the power of Austria began to recover ground. Radetzky had at first been reduced to maintain a defensive position at Verona, against the revolutionary forces led by Charles-Albert

of Sardinia. But in the course of the summer he took the offensive against the Sardinians, and defeated them at Custoza. The fruits of the victory were the dissolution of Charles-Albert's army, and a truce which again delivered Lombardy to Austria.

In the meantime, the government at Vienna was more powerless than ever. The emperor remained at Innsbruck, and a constituent diet was opened in July by the Archduke John, as his representative. But order was never permanently restored, and affairs were brought to a crisis by the proceedings in Hungary. Jellachich, Ban of Croatia, refused obedience to the Hungarian government, a course which, while openly condemned, was secretly encouraged by the Austrian court. The Archduke Palatine, Stephen, left Hungary, after a last attempt at conciliation; and the emperor, who had returned to Vienna after repeated invitations, named Count Lamberg commissioner, with the supreme command in Hungary. Lamberg, however, was murdered on the bridge of Pesth (September 28). Though the dissolution of the Hungarian parliament was now declared, it continued its sittings, and appointed Kossuth president of the committee of defence. The leaders of the popular movement in Vienna were in sympathy with Hungary, and when the imperial troops were ordered to suppress the national rising there, the citizens again rose in insurrection. The arsenal was stormed, and the war-minister, Latour, murdered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organised, and the Polish general, Bem, put at the head of military affairs. In the meantime, the military forces had withdrawn from the capital, and joined Jellachich, in order to prevent the Hungarians coming to the aid of the Viennese. Windischgrätz now laid siege to the capital, which surrendered at the end of October, after a resistance of eight days. The reaction was triumphant, and the leaders of revolt severely punished; but as Ferdinand had not shown sufficient vigour in the great crisis, he was persuaded to abdicate, and Francis-Joseph was declared emperor at the age of 18. Thus restored, the central authority had now to assert itself in Hungary and to complete the reconquest of Northern Italy. In the former country, the imperial troops had at first met with great success and retaken the capital, but they could not maintain themselves there. In Italy, Radetzky made his rapid and decisive campaign of 1849, and, by the victory of Novara, completed the overthrow of Sardinia. With the surrender of Venice, which took place in August, the subjugation of Italy was complete. At the same time, in the National Assembly at Frankfort, Austria opposed the project of a confederation of states under the leadership of Prussia, and managed to thwart the conferring of the empire of Germany on the Prussian king.

In Hungary, the Magyars, though the Germans and Slavs within the country itself were hostile to them, began the campaign of 1849 with decided success. Bem conquered Transylvania. These and other successes encouraged Kossuth to proclaim the deposition of the House of Hapsburg, and the re-establishment of Hungary as a separate state. Buda was retaken from the imperial troops, which were driven back on Presburg. But the government had already solicited the aid of Russia, whose armies, entering Transylvania and Hungary, added to the imperial cause the irresistible weight of numbers. Surrounded on every side by superior forces, the Hungarians were completely beaten. It was in vain that Kossuth transferred the dictatorship to General Görgei (q.v.). Görgei, whether from treachery, as the other Magyar leaders maintained, or from necessity, as he himself avowed, laid down

his arms to the Russians at Vilagos (August 13). The surrender of Komorn, in September, completed the subjugation of Hungary, which was treated as a conquered country.

The ten years which followed on the revolutionary troubles of 1848 were a period of reaction and of absolutism. A constitution which had been granted in 1849 was soon annulled. The policy pursued was one of strong centralisation under a bureaucratic government, by which the claims of nationality and of freedom were alike disregarded. Liberty of the press and trial by jury were set aside. A rigorous system of police was maintained. The aim was to Germanise the whole empire and to crush the aspirations of both Slavs and Hungarians. As the Catholic Church pronounced against national freedom, and supported the central authority, it received the greatest privileges by the Concordat of 1855. The result of all these proceedings was only to irritate the national feeling in Hungary, Italy, and Bohemia. The finances, too, notwithstanding vigorous measures for improving the material resources of the country, continued in a bad state, so that incessant loans were required to cover the current deficit.

On the confused arena of German politics, the struggle for ascendancy was kept up between Austria and Prussia. In 1850 the two powers were armed and ready to come to blows with reference to the affairs of Hesse-Cassel (q.v.); but the bold and determined policy of Schwarzenberg prevailed, and by the humiliating arrangement of Olmütz, Prussia gave way (see GERMANY). For a few years longer the preponderance of Austria in the German Confederation was secured.

During the Crimean war, Austria had a very difficult part to play. It felt its indebtedness on the one hand to Russia for help in the great crisis of 1849, on the other it could not without uneasiness see the development of Russian power in the Balkan Peninsula. It occupied the Danubian principalities with the consent of Turkey, but otherwise remained neutral in action. Yet its whole influence was thrown into the scale against Russia. The Crimean war was not brought to a termination without disclosing a power which was to break the Austrian domination in Italy. Under the leadership of Cavour, Sardinia had taken part in the war, and had again brought the Italian question to the front. The rule of Austria in Italy had always been unsatisfactory. From her own provinces in Venice and Lombardy she controlled the policy of the courts of Central and Southern Italy, and her influence tended invariably towards the suppression of national feeling and popular liberty. Sardinia was the only state that worthily represented the spirit of the Italian people. In the spring of 1859 it began to arm against Austrian supremacy. Austria demanded immediate disarmament, on pain of war; but Sardinia refused. Austria accordingly commenced hostilities by crossing the Ticino at the end of April 1859. Sardinia having secured the aid of France, the Austrians were defeated, and their emperor was fain to conclude an armistice with Napoleon. On the 12th of the same month, the two potentates met at Villafranca, and concluded a peace, the chief condition of which was the cession of Lombardy to Sardinia (see ITALY). Venice was all that remained of the Italian possessions of Austria.

The rivalry of Prussia and Austria for influence in the Germanic body of states dated from the rise of Prussia to be a leading power. The arrangement of Olmütz in 1850 had left a painful feeling of humiliation in the minds of the Prussian statesmen. The long rivalry was now to be brought to a decisive issue. In 1864 the combined Prussian and Austrian forces drove the Danes out of Sles-

wick-Holstein, but the two victors quarrelled about the subsequent arrangements. War was declared, and in 1866 the Austrian armies in Bohemia were completely beaten by the Prussians, in a campaign of seven days, which closed with the great defeat of Königgrätz or Sudowa. The middle states of Germany which supported Austria were occupied by Prussia. Sardinia, which had formed an alliance with Prussia, was, however, defeated at Custozza. The result of the contest was to exclude Austria from Germany, and she had to hand over to Sardinia the province of Venetia, a cession by which she was also excluded from Italy. Thus was Austria finally shut out from the scenes where for generations she had not unsuccessfully striven to uphold her supremacy. The sphere of development remaining to her was to be found in her own circle of states and in the East.

Since the great war of 1866, the history of Austria has been concerned chiefly with two important interests. In the first place, the government had to attempt an arrangement of the conflicting claims and rights of the peoples constituting the empire; in the second place, it has had to establish working relations with the great neighbouring powers, Germany and Russia, and especially with the latter on the Eastern Question. After the collapse of 1866, the most enlightened Austrian statesmen saw that the true policy of the empire could no longer consist in repressing national claims and constitutional freedom. During the last war, the feeling in Hungary had been lukewarm, and even actively hostile to Austria. The Saxon Count Benst, who was now called to be the head of the Austrian foreign office, advised that an understanding with Hungary was essential. The same policy found a firm and judicious advocate in Francis Deak, an influential Hungarian. The political independence of Hungary was recognised; and the emperor was crowned king at Pesth in accordance with the old historic rites (1867). Soon thereafter he sanctioned the decisions of the Hungarian Diet concerning the relations of the kingdom of Hungary with the other countries of the empire. Such was the famous *Ausgleich*, or agreement between Hungary and Austria Proper, which has since been in force, and on the whole has worked very well. It has at least been a great improvement on the previous condition of chronic ill-feeling on the part of Hungary. Within the territories of Austria Proper there has been a large development of constitutional freedom. At the end of 1867, the first parliamentary ministry in Cisleithania was formed. The Concordat was set aside. Education was freed from the control of the Catholic Church. Marriage was placed under the jurisdiction of the civil power. The press laws were relaxed. Finally, the Prussian system of military organisation was introduced. In Austria itself, however, there are national claims which have not, as in the case of Hungary, been satisfied. Bohemia especially has insisted on its old historic rights, but without success; for besides other reasons, the question is complicated by the presence of about two million Germans on Bohemian soil. The Slav element in Austro-Hungary, which is so large, which is partially discontented and more or less disposed to look towards Russia as the head or centre of their race (see PANSLAVISM), is an admitted source of weakness and danger to the empire. Some of her statesmen have advocated a system of Federalism as the only method of reconciling the diverse national claims with the existence of the empire. The attempt to realise it in 1871 failed, owing to the opposition of the Germans and Magyars.

In the foreign affairs of Austria, the chief aim has been to find a *modus vivendi* with Germany

and Russia. Since 1871 an informal alliance has subsisted between the empire and Germany; and the participation of Russia constituted for a time an 'Alliance of the three Kaisers.' But the Eastern Question is a continual source of difficulty between Russia and Austria. In the Russo-Turkish war of 1877-78, Austria's difficulties were aggravated by the strongly expressed sympathy of the Magyars with the Turks; and the development of Russian schemes in Bulgaria further strained relations. Bismarck gave Austria the support of Germany by a formal but secret alliance, concluded in October 1879, which was published only in February 1888, when military movements in Russia, with defensive measures in Germany and Austria, were pointing to the likelihood of war. The treaty bound Austria and Germany to regard an attack by Russia as either state as an attack on itself.

Since the exclusion of Austria from the Italian Peninsula, her relations with the new kingdom have generally been harmonious, in spite of the question of the *Italia Irredenta* (q.v.). Her true sphere of action is now recognised to lie in the south-east, in the valley of the lower Danube, and in the Balkan Peninsula. But for the efficient fulfilment of this great mission she is not a little weakened by the conflicting claims and interests of the nationalities that exist within her borders. Till they are reconciled, the position of the Austro-Hungarian empire must be regarded as unstable and uncertain.

As reference to an earlier paragraph will show, in the dual monarchy there are in round numbers ten millions of Germans, six millions of Magyars, sixteen of Slavs, three of Roumans, and one and a half millions of Jews; and each of these races hates and distrusts one or more of the others. The bitterness is keenest between Germans and Czechs, Magyars and Slavs of Hungary, Magyars and Roumans. The multiplicity of races and their mutual jealousies render the task of the central government delicate and difficult; but it is in another way a source of strength for the monarchy. The principal races are so scattered over the area of the empire that joint action on the part of any one of them is impossible; thus the northern Slavs are separated from their brethren in the south. Each stock has a special affinity for a foreign power: the Germans for the empire of Germany, the Czechs for Russia, the southern Slavs for Servia, the Roumans for Roumania. Each race in the Austrian empire would, if it tried to stand alone, be crushed by its rivals within the monarchy, or absorbed by the surrounding powers. The supreme condition of safety is that the various races of Austria should cling closely together in danger, and should find their best bond of defence in the 'personal' union under the emperors of the House of Hapsburg. And in spite of its lack of genius and generosity, its political blundering and frequent defeat in war, that dynasty has not seldom experienced the most devoted loyalty from the various races composing the empire.

For geography and statistics, see works by Brachelli, Hannak, Trampler, Unkluft, Klun, Strahalm, and D. Kay (Lond. 1880); for the history, Léger's *Histoire de l'Autriche-Hongrie* (Par. 1879; Eng. trans. 1888), Cox's *History of the House of Austria*, and works by Schmeller, Meilath, Liechnowsky, Mayer (1874), Krones (1879).

Austria, ARCHDUCITY OF, the cradle and nucleus of the Austrian empire, lies on both sides of the Danube, from the mouth of the Inn to Presburg, on the borders of Hungary, and embraces an area of 18,052 sq. m., with a pop. of nearly 3,300,000. It now forms three of the crownlands, or administrative provinces of the empire—viz. Lower and Upper Austria (i.e. Austria below, and Austria above, the Ens), and the duchy of

Salzburg (see preceding article; also SALZBURG). The south and west portions are mountainous; the north and east are more level and fertile, containing the great plain of Vienna, the Marchfeld, &c. The population is mostly German and Catholic. The chief towns, besides Vienna, are Wiener-Neustadt, Salzburg, Steyer, Linz, and Ischl.

Auteuil, formerly a country village at the entrance of the Bois de Boulogne, now inclosed within the fortifications of Paris. It is known as the residence of famous literary men—such as Boileau and Molière.

Autochthones, the Greek name for the original inhabitants of a country, not settlers, considered as having sprung from the soil itself. The Athenians were fond of being so called; the ancients counted among autochthonous races also the Arcadians, Latins, Gauls, and Scythians. The Latin equivalent term was *aborigines*.

Auto'cracy (Gr., 'sole mastery,' 'ruling by one's self') signifies that form of government in which the sovereign unites in himself the legislative and the executive powers of the state, and thus rules uncontrolled. Such a sovereign is therefore called an autocrat. Nearly all eastern governments are of this form. Among European rulers, the emperor of Russia alone bears the title of Autocrat, the name indicating his freedom from constitutional restraint of every kind. Such is the theory or principle of an autocracy, but it should be remembered that even the most rigorous autocrat must in practice have regard to the feelings and opinions of those about him. There are real though not formal checks. In autocratic states, palace or court revolutions are not infrequent. This has been a marked feature of Russian history, especially in the 18th century. These revolutions often result in the deposition and assassination of the sovereign. In point of fact, the peculiar feature of an autocracy is the absence of regular and constitutional limits; it is a strong form of 'personal rule.' See ABSOLUTISM.

Auto da Fé (Port., 'act of the faith'; Span. *Auto de Fé*) was the name given to the solemnity that from 1481 used to take place in Spain and Portugal at the execution of heretics condemned to death by the Inquisition. It was generally held on a Sunday between Whitsunday and Advent, very often on All-Saints' Day. At dawn, the dismal tolling of the great bell of the church gave the signal to begin the drama of the day; for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the 'holy' tribunal at these processions, and even grandees of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of the Inquisition; next followed the penitents, on whom only penance had been laid; behind them, and separated by a great cross which was borne before, came those condemned to death—barefoot, clad in robes painted with hideous figures called the *Sanbenito*, and with a pointed cap on the head; then, effigies of fugitives; and lastly, the bones of dead culprits, in black coffins painted with flames and hellish symbols. The frightful train was closed by an army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced, the accused standing meantime before a crucifix with extinguished torches in their hands. After the sentence had been read to them, an officer of the Inquisition gave each of the condemned a blow on the breast

with his hand, as a sign that they were given over by that tribunal to the secular power; on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterwards, they were brought to the place of execution. If they yet, at the last, made profession of the Catholic faith, they were so far favoured as to be first strangled; otherwise, they were burned alive, and with them the effigies and bones of the fugitive and dead culprits. As a rule, the king, along with his whole court, had to exalt by his presence the solemnity of the horrid transaction. The most splendid auto da fé took place at Madrid, under Charles II., in 1680; and so late as 1826 a Jew and a deistical schoolmaster were, the one burned, the other hanged, under the forms of an auto da fé, at Valencia. See INQUISITION.

Autograph (Gr.), something written in a person's own handwriting, and not by an amanuensis, whether a mere signature or a whole manuscript, as opposed to a *copy*. From the 16th century onwards, but especially in modern times, the collection of autographs has become an object of eager pursuit; and consequently since 1801 they have formed a branch of literary trade. The value of autographs is determined by the interest felt in the writer, the scarcity of such relics of him, and the contents of the writing. Besides portraits of famous persons, we naturally wish to possess a specimen of their handwriting, as the peculiarity of the style—the physiognomy of the handwriting—completes our knowledge of their personality. In 1858 a signature of Shakespeare was purchased by the British Museum for 300 guineas; whilst at the Joy sale in 1887 a letter of Defoe's, indorsed by Sir Walter Scott, fetched £65. Lithography is particularly serviceable in this matter, not only by supplying fac-similes for biographical and historical works and for portraits, but also by multiplying impressions of collected autographs. Such have been published in England by Nichols (1829), and in Germany by Wasmuth (1885). But deserving mention before all others are the *Isographie des Hommes Célèbres* (4 vols. Paris, 1843); the collection of French autographs by Delpech (1832), and of German by Schlottmann (3d ed. 1858). There have been works published containing the sign-manuals of distinguished musicians, of the great poets, &c. Forgeries of autographs are not infrequent. All Europe took a lively interest in the autographs of the most eminent men of all times from Cæsar downwards possessed and partly published by M. Charles, until in 1867 that eminent mathematician had to own he had been duped by a forger. See Fontaines, *Manuel de l'Amateur d'Autographes* (1836); and Günther and Schulz, *Handbuch für Autographensammler* (1856). Charavay started in 1862 a periodical called *L'Amateur d'Autographes*; and List and Francke in 1884 the monthly *Mitteilungen für Autographensammler*.

Autogravure, a peculiar process of photo-engraving patented by J. R. Sawyer, London, on November 12, 1884. If an ordinary antotype carbon print be placed on silvered copper instead of on paper, the slight relief which the picture possesses is enough to admit of an Electrotpe (q.v.) being taken from it. The raised parts of the print become the depressed parts in the electrotpe. The latter can therefore be used for taking impressions from in the same way as an engraved copperplate. See PHOTOGRAPHY, ELECTROTPE.

Autolycus, (1) a son of Heracles, maternal grandfather of Ulysses. He lived on Mount Par-nassus, and was famous for his cunning and robberies; similarly, in Shakespeare's *Winter's Tale*, Autolycus is a 'snapper up of unconsidered trifles.' A 'literary Autolycus' is a plagiarist.—

(2) A Greek astronomer and mathematician of Pitane in Æolia, about 330 B.C., who wrote two works, on the revolving sphere, and on the rising and setting of the fixed stars.

Automatism (Gr., 'self-movement'), a term applied to the power of initiating vital processes from within the cell, organ, or organism, independently of any direct or immediate stimulus from without. External conditions produce effects within the living matter which may lie dormant for a time, and only subsequently find expression in activities without apparent external stimulus. The heart of a cold-blooded animal like a tortoise may be isolated from the body without interrupting the beat, which will indeed, in certain conditions, continue for days; the conditions of its activity are contained within itself—it is automatic. The highest form of automatism is that exhibited in the will of man and the higher animals—they can act without direct interference from without. But the word, applied to animal life, is often used of that which is involuntary and merely mechanical; especially indicating the Cartesian doctrine, that animals (other than man) are like automata, mere machines, without either the vegetative or sensitive soul allotted to them by Aristotle. See PHYSIOLOGY, NERVOUS SYSTEM, LIFE.

Automaton is derived from two Greek words signifying self-movement, and is usually applied to machinery constructed to represent human or animal actions; 'automatic' used of an apparatus, implies that it does its work with little or no guidance or interference from man, as in a telegraphic 'automatic transmitter.' The construction of automata has occupied the attention of mankind from very early ages. Archytas of Tarentum is reported, so long ago as 400 B.C., to have made a pigeon that could fly. Hero of Alexandria describes in his book upon pneumatics a number of automatic contrivances which depend upon well-known principles. Other ancient writers record similar devices; but it is difficult to understand how these could have been made at a time when technical knowledge was at a low ebb. Many of them doubtless were simple tricks to impose upon the superstitious and credulous. One of the most perfect automata was one constructed by M. Vaucanson, and exhibited in Paris in 1738. It represented a flute-player, which placed its lips against the instrument, and produced the notes with its fingers in precisely the same manner as a human being does. In 1741 M. Vaucanson made a flageolet-player, which with one hand beat a tambourine; and in the same year he produced a duck. This was a most ingenious contrivance, the mechanical duck being made to conduct itself in every respect like its animated pattern. It swam, dived, ate, drank, dressed its wings, &c. as naturally as its live companions; and, most wonderful of all, by means of a solution in the stomach, it was actually made to digest its food! Brewster says of this duck 'that it was perhaps the most wonderful piece of mechanism that was ever made.' This statement is qualified by Robert Houdin, the celebrated conjuror, into whose hands Vaucanson's 'duck' was placed for repair. He found that the so-called 'digestive process' was brought about by a vulgar trick altogether unworthy of its author, who was without doubt a clever mechanic. M. Broz, a Swiss, made for the king of Spain a sheep that bleated, and a dog which guarded a basket of fruit. If any of the fruit was taken away, the dog barked incessantly until it was replaced. He also made a singing-bird, which was ultimately quite eclipsed by another made by Maillardet.

The 'Piping Bullfinch,' first exhibited at the London Exhibition of 1851, was a very perfect example of those automata which imitate the movement and song of birds. This piece of apparatus was a box of the size of a large snuff-box. Upon touching a spring, a tiny bird sprang from it, fluttered its wings, and trilled the true pipe of the bullfinch. The sound in reality came from the box, which contained a small pipe which could be shortened and lengthened by the action of a piston, so as to give different notes. It was controlled by a lever, which was actuated by studs on a small clockwork barrel, the necessary wind being furnished by bellows. It was indeed a very elaborate adaptation of the same principle which actuates the mechanical cuckoo in the well-known Swiss clocks. And in this connection, famous complicated clocks like that in the cathedral of Strasburg deserve mention.

Most of the automata which draw or write have probably been adaptations of the pantograph principle, and have in recent years been displaced by the writing telegraph of Mr E. A. Cowper. This, of course, is not an automaton, but it is mentioned here as a marvellous proof of what can be accomplished by electrical means. The system was worked for some months on the South-western Railway, between Waterloo and Woking stations, a distance of 26 miles. Messages written at one of these stations were reproduced in the handwriting of the operator at the other. Houdin, the famous conjurer, made a writing and drawing automaton, which made a great sensation when exhibited in Paris. It was set in motion by clockwork. Faber's talking machine, exhibited in various cities some years ago, has been classed among celebrated automata; but it has no claim to this distinction, for it was worked by keys and pedals. It very imperfectly reproduced speech by mechanical means. Kempelen's chess-player was long regarded as an automaton, but it is now known that a crippled officer—a famous chess-player—was concealed within the figure, and that he used this means to escape from Russia, where a price had been set upon his head.

Of late years all previous efforts in the making of automata have been surpassed by Mr J. N. Maskelyne, who may truly be said to have commenced a new era. The first one, 'Psycho,' was introduced to public notice in January 1875. This is a seated figure of light construction. During performance it is doubly insulated by being placed on a glass cylinder, which stands upon a small movable platform, furnished with porcelain castors. This arrangement at once negatives the idea that it may be worked by electricity. The figure moves its head, and from a rack in front of it chooses the cards necessary for playing a hand at whist, which it plays in a masterly manner. It will also work out calculations up to 100,000,000, showing the entire total of each calculation in a box in front by opening a sliding door. It acts without any mechanical connection with anything outside it, and yet is so much under control that it executes all orders intelligently. The nature of this control is so secret that, although Mr Maskelyne's assistants are aware that certain operations produce certain results, they are quite ignorant as to the principle upon which the automaton works. Zoe (1877) is another automaton which owes its creation to Mr Maskelyne's ingenuity. This is also a sitting figure—insulated, and having no mechanical connection with anything else. During performance there is placed in front of it a sheet of drawing-paper, upon which it traces the likeness of any public character which may be chosen by the spectators from a list of 200 names. Mr

Maskelyne has also constructed other automata, which play upon musical instruments, and perform other surprising feats. The principles involved in their construction are secret. See PNEUMATICS, HERO OF ALEXANDRIA; Brewster's *Letters on Natural Magic*; Houdin, *Secrets of Conjuring*; *Memoirs of Houdin*; Hutton's *Mathematical Recreations*.

Autonomy (Gr., 'self-legislation') is the arrangement by which the citizens of a state manage their own legislation and government; and this evidently may, with certain restrictions, be the case also within limited bodies of the same people, such as parishes, corporations, religious sects. These districts or communities may be autonomous, if not absolutely, yet within certain defined limits. They may be said to enjoy a partial, limited, or local autonomy. Autonomy is often used to designate the characteristic of the political condition of ancient Greece, where every city or town community claimed the right of independent sovereign action. Recently the word is more specifically used of territories or provinces, which, while subject in some matters to a higher sovereignty, are autonomous in other respects. Thus the Treaty of Berlin made Eastern Rumania an 'autonomous province,' though subject to the direct political and military authority of the sultan, it was to have 'administrative autonomy' in all its internal affairs. Egypt possesses a higher autonomy. The self-government enjoyed by the British colonies may be described as a modified form of autonomy; so also the Home-rule claimed by Ireland. But these are not usual applications of the word.

Autoplasty (Gr., lit. 'self-formed'), a mode of surgical treatment which consists in replacing a diseased part by means of healthy tissue from another part of the same body. The most familiar instance is the Rhinoplastic or Taliascotian operation, for supplying a new nose from the skin of the forehead.

Autopsy (Gr., 'seeing for one's self'), eye-witnessing, a direct observation; but generally used of a Post-mortem (q.v.) examination or dissection of the dead body.

Autotype. In this process, a sheet of paper coated with a film of bichromatised gelatine, in which lampblack or other permanent pigment has been held in solution or suspension, is exposed to the action of light, in a printing-frame, beneath an ordinary photograph negative. In proportion as the light is admitted to the gelatine film or 'tissue,' through the negative, it becomes hardened and insoluble in water. The print is afterwards treated by washing away the unaltered portions of the film, and the result is a permanent print of the object photographed. The process is admirably adapted for the reproduction of oil-paintings; and the enormous series of autotypes from the chief works in all the great public galleries of Europe, published by the Messrs Brann of Dornach, near Mülhausen, are unrivalled in this direction. The process has also been successfully employed for the reproduction of drawings; but where the work to be copied has a perfectly dead surface—as is the case, for instance, with charcoal sketches—the slight gloss possessed by the autotype print is a disadvantage. This objection is still greater in the reproduction of engravings and etchings; and for these the heliogravure process of M. Amand Druaud of Paris is preferable, as here a metal plate is prepared by the aid of photography—more or less supplemented by retouchings by the hand with burnin or etching-needle—and can be printed in ink and upon paper exactly similar to those of the original engraving or etching which is being copied. Autotypes, and

also heliogravures, can be printed with a margin, without mounting; a great advantage when book illustrations are required, as mounted photographs never preserve a perfectly flat surface, but, with the slightest change of temperature, warp the paper to which they are attached in a most unsightly manner. See PHOTOGRAPHY.

Autumn, the third season of the year, between summer and winter. Astronomically, in the northern hemisphere, it begins at the autumnal equinox, when the sun enters Libra, 22d September, and ends at the winter solstice, when the sun enters Capricorn, 21st December; but popularly, in Great Britain, it comprises the three months, August, September, and October. According to Litré, it extends in France from the end of August to the first fortnight of November; according to Webster, in North America it includes the months of September, October, and November. In the southern hemisphere it corresponds in time to the northern spring.

Autun, a town in the French department of Saône-et-Loire, in the Burgundian district of Autunois, situated on the river Arroux, 31 miles NW. of Châlon by rail. It is the seat of a bishop, and has a fine cathedral (12th century, restored 1865), college, museum, and library, and many ruins of Roman temples, gates, triumphal arches, and other antiquities. Cloth, carpets, and velvet are manufactured, and there is an active trade in horses, corn, and wood. Autun was the ancient *Augustodunum*, and has been by many identified with the earlier *Bibracte*, the chief city of the *Ædui*, though it seems more likely that the site of the latter was Beaurvray, 10 miles distant. Under the Romans it became a famous school of eloquence. It was destroyed by *Terminus* in 270 A.D., but was rebuilt by *Constantine the Great*. It was burned and pillaged by the *Vandals* in 406, *Burgundians* in 414, *Huns* in 451, *Franks* in 539, and *Saracens* in 739, and nearly destroyed by the *Normans* in 895. In 1379 it was burned by the English. At the Council of Autun (1094), *King Philip I.* was excommunicated for divorcing his queen, *Bertha*. The famous *Talleyrand* was bishop of the diocese, and here *MacMahon* was born. Pop. (1886) 13,194.

Auvergne, a southern central district of France, was before the Revolution a separate province, and coincided nearly with the modern departments of Cantal and Puy-de-Dôme. Auvergne falls naturally into two divisions: Upper Auvergne, to the south, rugged and mountainous; and Lower Auvergne, to the north, some parts of which, especially on the left bank of the *Allier*, are distinguished for extraordinary fertility. The climate is subject to violent extremes and great storms, cold in the mountainous districts, whilst in the plains the heat of summer is often oppressive. Not only do the cone and dome-like shapes of the summits betray a volcanic formation, but also the great masses of basalt and trachyte that break through the crust of granite and gneiss, render it manifest that this was a great focus of volcanic action at a comparatively recent period. Among the summits that have apparently been at one time volcanoes, the most remarkable are Cantal (6093), Mont-Dore (6188), and Puy-de-Dôme (4806): all are now covered with verdure. The lava-covered plateaus are desert, but the pulverised volcanic earths that cover the slopes and valleys form a rich and fruitful soil. Agriculture is in a rude and backward condition; but the breeding of cattle, especially of mules, is diligently carried on. Auvergne produces iron, lead, copper, and coal, and is rich in valuable mineral springs, both cold and hot.

The Auvergnats are a highland people, rude and ungainly, poor, ignorant, and, though of southern temperament, laborious. They are probably the almost unmixed descendants of the ancient inhabitants of this part of Gaul, and speak a dialect of their own. Large numbers of them go to service in Paris and other northern towns, where they are marked by their pronunciation. Auvergne has, however, produced distinguished men, such as the *Arnauld* family, *Lafayette*, and *Polignac*. The chief towns are Clermont and Aurillac (q.v.). The country derived its name from the Celtic *Æveni* or *Arverni*, who long defended their fastnesses against *Cæsar*, as later against the *Goths*, *Burgundians*, and *Franks*. Long a separate county, it was not incorporated with France till 1531.

Auxerre (anc. *Autissiodorum*), the chief town of the French department of Yonne, stands on the river Yonne, 109 miles SE. of Paris by rail, in a rich district abounding in vineyards. It is poorly built, but presents an imposing aspect from a distance, the most prominent feature being the noble Gothic cathedral, which dates from 1215, but was not completed till the 16th century. There are two other interesting churches, a museum, a large library, statues of *Fourier* and *Davout*, &c. Auxerre was a flourishing town before the Roman invasion of Gaul. It was destroyed by the *Huns* in 451, and in 486 was wrested by *Clovis* from the *Romans*. The county of Auxerrois came finally in 1477 to the kingdom of France. The principal manufactures are wine (a light Burgundy), candles, chemicals, and hosiery. Pop. (1886) 16,754.

Auxonne, a fortified town in the French department of Côte d'Or, on the left bank of the *Saône*, 20 miles SE. of *Dijon*. It has a 14th-century church, a 16th-century castle, and a statue (1857) of *Napoleon I.* Pop. 5500.

Ava, a ruined city of *Burma*, of which it was the capital from 1364 to 1740, and again from 1822 to 1838. It stands on the left bank of the *Irawadi*, about 6 miles to the SW. of *Amarapura*. Ava now is almost a desert, its temples and houses having been reduced to ruins by an earthquake in 1839. On the opposite bank stands *Saguing*, which has twice been the seat of government.

Ava, Arva, Yava, or *KAVA* (*Piper methysticum*), a plant of the natural order *Piperaceæ* (q.v.), possessing narcotic properties. Until recently, it was ranked in the genus *Piper* (*Pepper*). It is a shrubby plant, with heart-shaped, acuminate leaves, and very short, solitary, axillary spikes of flowers. It is a native of many of the South-sea islands, where the inhabitants intoxicate themselves with a fermented liquor prepared from the upper portion of the root and the base of the stem. The rhizome is thick, woody, rugged, and aromatic. The intoxicating liquor is prepared by macerating it in water. The savage *Tahitians* were accustomed to prepare it in a very odious manner; much as the *Indians* of the *Andes* prepare *Chica* or *Maize beer*--chewing the root, depositing it in a bowl, straining through coconut husk, and mixing with water or coconut milk. As the beverage was drunk immediately afterwards, no fermentation could have taken place, and the narcotic property is therefore ascribed to an acrid resin, *Kawine*, which is present in the root. For an account of the manufacture of the beverage, see *Mariner's History of the Tonga Islands*. The taste is unpleasant to those unaccustomed to it, and has been likened to that of rhubarb and magnesia. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of *ava* causes a whitish scurf

on the skin, which, among the heathen Tahitians, was reckoned a badge of nobility, the common people not having the means of indulgence requisite to produce it. Ava is, like cocaine, a local anæsthetic.

Avalanches (Fr., from *aval*, 'to descend') are masses of snow or ice that slide or roll down the declivities of high mountains, and often occasion great devastation. They have various names, according to their nature. Drift or powder avalanches (Ger. *Staub-lawinen*) consist of snow, which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent, and comes suddenly into the valley in an overwhelming dust-cloud. Avalanches of this kind occur chiefly in winter, and are dangerous on account of their suddenness, suffocating men and animals, and overturning houses by the compression of the air which they cause. Another kind of avalanche resembles a landslide. When the snow begins to melt in spring, the soil beneath becomes loose and slippery; and the snow slides down the declivity by its own weight, carrying with it soil, trees, and rocks. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring beginning to roll or slide on these slopes, is hurled over the precipices with fearful force into the valleys. The very wind caused by them prostrates forests and houses. Ice avalanches are those that are seen and heard in summer thundering down the steep slopes - e.g. of the Jungfrau. They consist of masses of ice that detach themselves from the glaciers in the upper regions. They are most common in July, August, and September. Nine great Alpine avalanches, which cost 447 lives, are on record between 1518 and 1879, the most destructive being one of 1827, which swept away half the village of Bick in the Upper Valais, with 88 inhabitants. Sudden avalanches, larger or smaller, constitute one of the special dangers of Alpine climbing. See *Coaz, Die Lawinen der Schweizeralpen* (Bern, 1881). See GLACIER, ICE, ALPINE CLUB.

Avallon (anc. *Aballo*), a town of the department of Yonne, France, 26 miles SE. of Auxerre, on a steep hill of red granite, nearly surrounded by the river Cousin. Avallon is a very ancient town, of Celtic origin, and has been often besieged and taken. The church, in Burgundian Gothic, dates from the 12th century. Pop. 5500.

Avalon, the earthly paradise of Celtic mythology, a 'green island' far to the westward where the sun god seems to sink to his rest. Thither came heroes like the mighty Fionn and the great Arthur, and there they continued to live. Here were the mystic fountain, the apples (*arlan*) with their strange magical properties, and the mighty smith who forged 'Dure Entaille' for Arthur. The name was applied in the chivalrous poetry of the middle ages to the region where the fairy Morgana holds her court, and afterwards by rationalising historians to the Isle of Saints, an islet in the river Bret in Somersetshire: famous in romantic British history as an abode of Druids and the place to which Arthur was carried to get healed of his wounds.

Avalon, a peninsula forming the eastern part of Newfoundland (q.v.), in which St John's, the capital, is situated.

Avanturine. See AVENTURINE.

Avars, a tribe of Tatar origin, who made their appearance a hundred years later than the Bulgarians, in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained in the Caucasus, another part pressed

forward (about 555 A.D.) to the Danube, and settled in Dacia. Here they served in Justinian's army, and assisted the Lombards to overturn the kingdom of the Gepids; and, about the end of the 6th century, under the mighty Khan Baján, they conquered Pannonia. Later, they mastered Dalmatia; made devastating incursions into Germany and Italy; and extended their dominion over the Slavs living on, and northwards from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them, and in 640 A.D. drove them out of Pannonia. Confined to Pannonia, they were subdued by Charlemagne, and well-nigh extirpated by the Moravians, so that after 827 they disappear from history. They usually surrounded their settlements with fortifications of stakes driven into the ground, and earth, of which traces, under the name of Avarian Kings, are yet found in the countries formerly occupied by them. The results of recent criticism show that, in all probability, the Avars belonged to the same great Turanian stock as the Huns, and that their original residence was the land lying east of the Tobol, in Siberia.

Avatar (Sanskrit, *avatāra*) signifies primarily a descent, but is specially applied to the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It is thus almost synonymous in its signification with the Christian term 'incarnation.' The word is sometimes rhetorically employed in English literature as equivalent to manifestation or phase. The ten avatars of Vishnu (q.v.) are the most famous in Hindu mythology.

Avatcha, a bay on the east coast of Kamchatka, by far the best harbour of the whole peninsula, and containing within it the smaller bay on which stands the capital city of Petropavlovsk (q.v.). Avatcha Bay is one of the finest harbours in the world, and is surrounded by superb scenery. The name is also given to two volcanoes lying to the north - one (Govalaja Sopka) 8500 feet high; the other (Koryatskaya Sopka) 10,000 feet high.

Avebury, or **ABURY**, a small village of Wiltshire, 6½ miles W. of Marlborough. It is remarkable as the site of the largest megalithic structure in Britain, and as having in its neighbourhood several barrows and cromlechs of remote antiquity. A large outer circle, occupying a flat area of ground on the south of the Kennet, a diminutive tributary of the Thames, consists, or rather consisted, of a hundred large blocks of stone, placed on end in a circular form, around a level area 330 yards in diameter, bounded by a deep ditch and a high embankment. There are also remains of two smaller stone circles within the inclosure, one consisting of two concentric circles of 43 upright stones, with a menhir, or obelisk, 20 feet high, near the centre; the other, a similar double circle of 45 stones, to the north west of the former, with a dolmen in the centre. The stones that remain of this ancient work are not of uniform size; they measure from 5 to 20 feet in height above the ground, and from 3 to 12 in breadth and thickness. The embankment, which is broken down in several places, had originally an entrance to the circle, from which issued the 'Kennet Avenue,' running 1430 yards south-eastward in a perfectly straight line, and 17 yards broad, with a range of blocks on either side similar to those of the circle itself. Of the surrounding antiquities, those which appear most closely connected with the circle are the double circle (155 × 138 feet) on Haken Hill, and a large barrow, or lofty conical mound called Silbury Hill, three-quarters of a mile to the south. It is situated nearly midway between the two

avenues, in the line of the ancient Roman road between London and Bath. Close to the base, it measures 676 yards in circumference; the sloping height is 249 feet; the perpendicular height, 130 feet; the diameter of the level area at the top, 104 feet; the space covered by the whole work, over 5 acres. Avebury was included in the Ancient Monuments Protection Act, 1882.

Very little was known of Avebury temple and the antiquities in its vicinity till the year 1740, when Dr Stukeley published his *Stonehenge and Avebury, Two Temples restored to the British Druids*; though Aubrey had written an account of them in 1663, by command of Charles II., the manuscript of which still exists. None of the earlier topographers or antiquaries appear to have left any description of them. When Sir Richard Hoare, in collecting materials for his *Ancient Wiltshire*, examined them in 1812, 72 years after the appearance of Stukeley's work, and 164 after the first survey by Aubrey, a great number of the stones had disappeared, and in many places it was difficult even the plan of the work.

to more recent inquirers, Mr Fergusson believes that the Avebury circle and Silbury Hill mark the graves of those who fell in the twelfth or last Arthurian battle, at Badon Hill (520 A.D.), whilst Sir John Lubbock assigns Avebury to the close of the stone, or the commencement of the bronze, age. See works cited under STONEHENGE.

Aveiro, a town of Portugal, in the province of Beira, 40 miles S. of Oporto by rail. It is situated on the Ria d'Aveiro, a salt lake or lagoon, joined to the sea by a canal. Aveiro is a bishop's see, manufactures sea-salt, and has valuable fisheries of sardines and oysters. Pop. 7167.

Avellino (anc. *Abellinum*), chief town of an Italian province of the same name, at the foot of Monte Vergine, 59 miles E. of Naples by rail. Avellino suffered greatly from earthquakes in 1694, 1731, and 1805. It has a cathedral and royal college, manufactures of linen, paper, hats, salami, and considerable trade in corn and in hazel-nuts, which were famous even in antiquity. Pop. (1881) 16,376; of province (1881) 393,228.

Avé Maria, also ANGELICA SALUTATIO or the Angelic Salutation, are names given by the Roman Catholics to a very common form of address to the Virgin Mary. *Ave Maria* are the first two words of the prayer, in Latin, which is taken from the angel Gabriel's salutation (Luke i. 28): 'Hail, Mary, highly favoured, the Lord is with thee; blessed art thou among women.' In this form, according to an ordinance of Gregory I., with the addition of Elizabeth's words, 'and blessed is the fruit of thy womb,' the invocation was at first said by the priests during mass, on the fourth Sunday after Advent. With the extended cult of the Virgin since the 11th century, the Ave Maria appears as a lay-prayer of equal use with the Pater Noster, and was sanctioned as such at the end of the 12th century. Accordingly, not only did Urban IV. (1261) add the concluding words, *Jesus Christus, Amen*, but since the first half of the 16th century, the prayer began to receive, more and more commonly, as an addition to the old formula, what constitutes the conclusion of the modern form: 'Holy Mary, mother of God, pray for us sinners, now and at the hour of our death, Amen.' The complete form in Latin is: 'Ave Maria, gratia plena, benedicta tu in mulieribus, Dominus tecum; et benedictus fructus ventris tui, Jesus. Sancta Maria, Mater Dei, ora pro nobis peccatoribus nunc et in hora mortis nostre, Amen.' An edict of John XXII. (1326) ordains that every Catholic shall, morning, noon, and evening, at the ringing of the bells, repeat three

aves. This ringing of bells as a summons to morning, mid-day, and evening prayer, is retained in some countries, and is still called the Ave Maria, or Angelus Domini. The whole prayer as it now stands is ordered in the breviary of Pius V. (1568) to be said daily before the Canonical Hours (q.v.), as well as after Compline. The aves are reckoned by the small beads of the rosary, which are hence called Ave Marias, while the large beads are devoted to the Pater Noster. The name *Angelus Domini* comes from the Latin version of the passage in Scripture introducing the salutation. There are famous musical settings of the Ave Maria by many of the great composers.

Avempace (*Ibn Badja*), Arabian philosopher, was born in Spain towards the close of the 11th century, most likely at Saragossa, lived as a physician in Morocco at the court of the Almoravides, and died at Fez in 1138. His principal work, known to us only through a Jewish writer of the 14th century, was the *Conduct of the Solitary*, a system of rules whereby mankind might rise to higher things.

Avens, the popular name of *Genn* (q.v.), a genus of Rosaceæ, of which two species, *G. urbanum*, the Common Avens, and *G. rivale*, or Water Avens, with their hybrids, are common in Britain, and range through temperate regions. The roots were formerly used in pharmacy as a tonic, astringent, and aromatic, whence the names of clove-root and herb-bennet (*herba benedicta*) of old herbals.

Aventine Hill. See ROME.

Aventinus [JOHANNES THURMAYR], a scholar and historian, born at Abensberg (Lat. *Aventinum*), Bavaria, in 1477, studied at Ingolstadt, Vienna, and Paris, and afterwards taught Greek and mathematics at Cracow. In 1509 the Duke of Bavaria called him to Munich, and intrusted him with the education of his sons. Here Aventinus wrote his history of Bavaria (*Annales Boiorum*). This work was not published until twenty years after his death, which took place at Ratisbon in 1534, and then only with large portions, more true than pleasant, about the Raminish Church, excised. These, however, were all restored in Ciser's edition of 1580. Aventinus wrote several other learned works on history and antiquities. A complete edition of his works was issued by the Bavarian Academy of Sciences (Munich, 5 vols. 1880-84). His monument was erected in his native town in 1861. See Döllinger's *Aventinus und seine Zeit* (Munich, 1877).

Aventurine, or AVANTURINE, a vitreous variety of quartz, generally translucent, and of a gray, green, yellow, red, or brown colour, and containing numerous minute spangles. These last are generally mica, but sometimes, according to some authorities, they are scales of metallic copper. It is used in jewelry, but is not so much valued as the finer kinds of amethyst or carnelian stone. It is found in Silesia, Bohemia, France, Spain, and India, but chiefly in the Ural Mountains, near Ekaterinburg. Beautiful imitations of aventurine are made. The name for the natural substance in fact is borrowed from that applied to the artificial gold-spangled glass which originated accidentally -- *all' accatura* (*par accature*) -- at Murano, near Venice.

Avenzoar (properly *Ibn Zohr*), ABU MERWAN, an Arabian physician, born in Spain about 1072, died in 1162. He was the teacher of Averrhoes (q.v.), who speaks highly of his wisdom. One of his works was translated into Hebrew in 1280, and from thence into Latin, and was published, under the title *Rectificatio Medicationis et Regiminis*, at Venice, in 1490. It has since passed through numerous editions (as at Lyons, 1851).

Average. If any number of unequal quantities are given, another quantity may be found of a mean or intermediate magnitude, some of the given quantities being greater, and others less, than the one found, which is called the average. The exact relation is this: that the sum of the excesses of the greater above the average is equal to the sum of the defects of the less below it. If there are seven vessels unequally filled with sand, and containing, say, 5, 10, 12, 8, 11, 14, 3 ounces, the average is found by adding the numbers together, and dividing the sum 63 by 7, which gives 9 ounces as the average. Reflection, however, requires to be exercised in striking averages. If a farmer has three lots of cattle, the first of which he averages at £25 a head, the second at £15, and the third at £9, it might be thought that the average of the whole stock made up of the three lots would be got by taking the mean of £25, £15, and £9—viz. $25 + 15 + 9 \div 3 = £16\frac{1}{3}$. But this would be correct only if there were an equal number of cattle in each of the lots. To get the real average in case of the lots being unequal, he must multiply the average of each lot by the number of cattle in it, add the three products together, and divide by the whole number of cattle in all three lots taken together. If we suppose 9 head in the first lot, 20 in the second, and 15 in the third, the average is $(25 \times 9) + (15 \times 20) + (9 \times 15) = 660 \div (9 + 20 + 15) = £15$.

General Average is a contribution made by the various interests associated in a maritime adventure to restore the value of any sacrifice or extraordinary expense voluntarily incurred for the general safety. This equitable rule is to be found in the Rhodian law (q.v.) and in the Rolls of Oleron (q.v.), and has been adopted with certain modifications and differences by all maritime nations. The requisites to this contribution are that the sacrifice of part of the cargo, ship, or rigging has been advisedly made to procure the safety of what remains. The loss must not be caused by fault of the master or improper stowage; thus the throwing overboard or jettison (q.v.) of deck cargo will not give rise to average unless the stowing on deck is customary or agreed to by the contributing parties. The value of the cargo thrown overboard is computed at the market price at the port of delivery, less freight and charges saved. Among other losses covered by general average are those arising from the discharge of cargo to lighten the ship, from damage to ship or cargo in order to extinguish fire, or from cutting away masts or slipping anchors and cables to save the ship. The expenses incurred in floating a stranded ship or entering a port of refuge are also included, but no loss or expense falling under the shipowner's contract to keep his ship fit for service will be so included.

The contributing parties are the owners of the ship, the cargo, and the freight, or in modern times the insurers of these, and they are assessed in proportion to their value. The owners of the cargo pay on the net market value at the port of destination, or where the voyage is broken up, and the goods jettisoned contribute as well as those saved, as otherwise the owner of the lost goods would be placed in a better position than the others. Seamen's wages, and the personal effects of crew and passengers, are exempt from contribution.

If the ship reaches her destination, the average must be adjusted at that port, and in accordance with the law of the place; but if the voyage is broken up, the port of loading is taken. The adjustment of averages is often a very complicated task, and is usually undertaken by persons specially engaged in that business, called average adjusters.

Much inconvenience has arisen from the want of a uniform system of general average in different

countries, and an effort to establish such a system was made by an international congress, the first meeting of which took place in Glasgow in 1860 under the presidency of Lord Brougham. At a subsequent meeting at York in 1864, a code of rules was drawn up, but no practical result followed. Another important conference, however, was held at Antwerp in 1877, when the York rules were revised; and the new code, known as the York-Antwerp rules, are gradually becoming generally recognised by means of a clause inserted in bills of lading and insurance policies.

Particular Average is the partial loss of ship or cargo, or damage thereto from accidental causes. In this case the common safety is not in question, and there is consequently no contribution, the loss remaining where it falls. To such cases the term average does not seem properly to apply, but the name has become applicable to all claims for loss at sea when not total, and its use in this case may possibly be explained by the consideration that such losses under marine policies are usually made good by contribution from various underwriters or joint-insurers.

An *Average Bond* is sometimes entered into by the contributories in order to fix an arbiter to adjust the average.

The best treatises on the subject of average are Hopkins' *Handbook of Average*, and Lowndes's *Law of General Average*. See INSURANCE, ADJUSTMENT OF AVERAGE.

The etymology of the word has caused much discussion. It first appears about the year 1500 in connection with the maritime trade in the Mediterranean, hence the corresponding Fr. *avarie*, Span. *averia*, Port. and It. *avaria*, as well as in the borrowed Ger. *havarie*, and Dutch *avarij*. The Italian form is most probably the original, from *avere*, 'goods'; Lat. *habere*, 'to have.' The It. *avere* is thus our old Eng. *avere*, 'property,' often specially in cattle—therefore 'cattle,' 'horses.' The reader of Burns will remember the word *averr*, 'an old horse.'

Aver'nus (Gr. *Aornos*, 'birdless'), called now Lago d'Averno, is a small, nearly circular lake in Campania, Italy, situated between Cumæ, Puteoli, and Baia. It is about a mile and a half in circumference, and occupies the crater of an extinct volcano. It is in some places as deep as 200 feet, and is almost completely shut in by steep and wooded heights. The sulphureous and mephitic vapours arising from the lake were believed in ancient times to kill the birds that flew over it; hence, according to some, its Greek appellation. Owing to its gloomy and awful aspect, it became the centre of almost all the fables of the ancients respecting the world of shades. Here was located Homer's entrance to the under world; here the Cimmerians are said to have dwelt in deep caverns, without ever coming into the light of day; here also were placed the Elysian fields, the grove of Hecate, and the grotto of the Cumean Sibyl. Agrippa caused the dense woods to be thinned, by which the place lost much of its wildness; and by a cutting connected it with the Lucrine Lake and the sea, so as to make it a kind of harbour, but the volcanic upheaval of the Monte Nuovo in 1538 altered the region, and made Avernus again an inland lake. On its east side are ruins of a temple of Apollo, on its south side what is shown as the famous grotto of the Sibyl.

Averrho'a. See CARAMBOLA.

Averrho'es, or AVERROES (properly *Ibn Roshd*), the most famous of the Arabian philosophers, was born at Cordova, in Spain, in 1126. His father, who was judge there, instructed him in Mohammedan jurisprudence. In theology and philosophy, he had Ibn Tophail for his teacher;

and in medicine, Ibn Zohr, the elder. His talents and acquirements made him be appointed successor to his father, and afterwards judge in Morocco. For a while he was the calif's physician. Being accused of a departure from the orthodox doctrines of Mohammedanism, he was dismissed from his office, and condemned to recant his heretical opinions, and do penance. After this, he returned to his native place, and lived in great poverty, until the Calif Al-mansur reinstated him in his offices, on which he went back to Morocco, where he died in 1198. Averrhoes regarded Aristotle as the greatest of all philosophers. He translated (from the Syriac) and illustrated Aristotle's writings with great penetration; but the influence of the Alexandrian or Neoplatonic views is seen in his works, as in those of most of the Arabian philosophers. Thus he teaches the doctrine of a Universal Reason (other than the individual reasons), indivisible, but shared in by all; and denied the immortality of individual men. He expounded the Koran according to Aristotle, and so founded a Moslem philosophy of religion, the cause of many heresies. In opposition to the Arabian orthodox school, especially against Algazali, Averrhoes stood forth on the side of reason as the defender of philosophy. The Arabians called him, by way of eminence, the Expositor (of Aristotle). Most of his writings are known to us only through Latin translations (Ven. 1489). The Arabic text of the philosophical works was published in 1859 by M. J. Muller, followed by a German translation in 1875. Averrhoes also wrote a sort of medical system, which, under the name of *Colliget*, was translated into Latin, and repeatedly printed. The philosophy of Averrhoes attained to importance in the Christian Church as early as the 13th century, although his pantheistic doctrine of the unity of the active principle in the universe was often repudiated as an error, and astrology was characterised as Averrhoism. See Renan's *Averrhoes et l'Avicennisme* (2d ed. 1860).

Aversa, a town of Southern Italy, in the province of Caserta, 12½ miles by rail N. of Naples, in a beautiful district rich in oranges and wine. It is well built, and has a cathedral and a number of monasteries, in one of which Andrew of Hungary, the Darnley of Neapolitan history, was murdered with the connivance of his wife, the beautiful but guilty Joanna, queen of Naples; it has also an excellent asylum for the insane, established by Murat, and a foundling hospital. Aversa was built in 1029 by the Normans. About two miles from Aversa are a few ruins of Atella, famous as the birthplace of the satirical farces so popular on the Roman stage (see ATELLANE). Pop. (1881) 20,183.

Aves. See BIRDS.

Avesnes, a town in the French department of Nord, 13 miles E. by rail of Cambrai, with a pop. (1881) of 5168, who make cloth, scap, and beer.

Avesta. See ZEND-AVESTA.

Aveyron, a department in the south of France, named from the river which runs westwards through it, and after a course of 90 miles falls into the Tarn, a feeder of the Garonne. The department of Aveyron has an area of 3,376 sq. m., in one of the most mountainous parts of France. Situated between the high *massif* of Auvergne and the Cévennes, it slopes like a *funnel* south-west to the Garonne. A third part of the land is unfit for cultivation, but affords excellent pasture for the numerous herds of cattle, goats, sheep, and swine, which form the principal resources of the mountaineer. The famous Roquefort cheese is exported hence in large quantities. Coal, iron, lead, zinc, copper, silver, alum, and antimony are found and

wrought; and paper, cotton and woollen cloths, and leather are produced. The capital is Rodez. There are many prehistoric remains in the department, which was formerly part of the province of Guienne. Pop. (1886) 415,826.

Avezzano, a town of South Italy, in the province of Aquila, 22 miles S. from Aquila, with old walls and a collection of antiquities. Pop. (1881) 6166.

Avianus, FLAVIUS, a Latin author who lived probably in the 3d or 4th century of our era, and of whose writings forty-two Æsopic fables in poor elegiac verse are extant. The editorials are those by Lachmann (1845) and Robinson Ellis (1887).

Aviary, a place for keeping birds. Amongst the Romans, the name *arvarium* was sometimes used of a place for keeping and fattening birds meant to be killed for food. The arrangements of an aviary depend upon the habits of its inmates, the climate suited to them, and other circumstances. A large room may be fitted up as an aviary, with complete arrangements for heating and ventilation, and with perches resembling trees and branches, patches of sand or gravel, secluded places for nesting, and a trough of clear water; or in the open air a large space may be included within the network, with actual trees and grass, and running water. In such spacious aviaries birds may be expected to thrive and breed better than in a bird cage, which is a small aviary. Large aviaries are often to be seen in zoological gardens.

Avicbron, long deemed, like Avempace, an Arabian philosopher, till Munk identified him in 1837 with Salomo ben Jehuda ibn Gabirol, a Jewish poet and philosopher. Born about 1020 at Cordova or Malaga, the latter in 1045 was expelled from Saragossa, and, after an unhappy, wandering life, died about 1070 at Valencia. His great work, *Mekor Chajim*, was written in Arabic; but through a Latin translation, *Fons Vita*, became known to the Schoolmen of the 13th century. Its speculations are largely based on those of the Neoplatonists, especially Plotinus. For a full account of it, and of Avicbron's religious poetry, artistic at once and profound, see two monographs by Geiger (Leip. 1867) and Stössel (*ib.* 1881).

Avicenna (Arabic *Ibn Sina*), a famous Arabian philosopher and physician, was born 980, near Bokhara, his father being a Persian tax-collector. He studied with singular zeal and success the Koran, mathematics, astronomy, the philosophy of Aristotle, and medicine. He was physician to several of the Samanide and Dilmite sultans, and also for some time vizier in Hamadan, where, after some years of retirement at Ispahan, he died in 1037. His works are based on those of the Greeks, whom he knew only through Arabic translations. His medical system, the *Canon*, long remained the standard of teaching and practice. His philosophy was Aristotelianism modified by Neoplatonic elements. Of his numerous writings, the chief, both medical and philosophical, were translated into Latin as early as 1493, and often reprinted.

Avicennia, or WHITE MANGROVE, a genus of Verbenaceæ (q.v.), consists of trees or large shrubs resembling mangroves (see MANGROVE), and like them, growing in tidal estuaries and salt-marshes. Their creeping roots, often standing six feet above the mud in crowded pyramidal masses, and the naked asparagus-like suckers which they throw up, have a singular appearance. The bark of *A. tomentosa*, the White Mangrove of Brazil, is much used for tanning. A green resinous substance exuding from *A. resinifera* is eaten by the New Zealanders. The genus is named in memory of the Arabian physician Avicenna.

Avicula. See PEARL OYSTER.

Avienus, RUFUS FESTUS, a Latin descriptive poet of some merit, who flourished about the end of the 4th century. His works are *Descriptio Orbis Terræ*, in 1394 hexameters; *Ora Maritima*, in 703 iambic trimeters, describing the Mediterranean shore from Marseilles to Cadiz; *Aratea Phenomena*, in 1325, and *Aratea Prognostica*, in 552 hexameters, a paraphrase of the two well-known works of Aratus. See Holder's edition (Innsbruck, 1887).

Avi-fauna (Lat. *avis*, 'bird,' and *fauna*), a collective term for the birds found in any country: the fauna or zoology of that region as regards the birds. See FAUNA.

Avigliano, a town of South Italy, in the province of Potenza, situated on a hill-ridge, 10 miles N.W. of Potenza. Its inhabitants rear cattle, and are noted for their peculiar costume. Pop. (1881) 12,949.

Avignon (*Arenio*), a city of Provence, capital of the French department of Vaucluse, is situated on the left bank of the Rhône, 75 miles N.W. of Marseilles. With narrow, crooked streets, 'windy Avignon' still is encircled by lofty crenellated walls (1349-68), except on the north side, where the Rocher des Doms rises steeply from the Rhône to a height of 200 feet. Here is the cathedral of Notre Dame, dating from the 11th century, with its papal throne, and monuments of two popes; whilst hard by towers the vast palace of the popes (1339-64). The multitude of churches and convents made Rabelais call Avignon *la ville sonnante*, 'the city of bells'; and churches there still are in plenty, though that of the Cordeliers, with the tomb of Petrarch's Laura, was demolished in 1791. Near the hôtel-de-ville (1862) are the quaint old Jacquemart bellry and a statue of Crillon, Henry IV.'s brave captain; Petrarch's statue (1874) may also be noticed. The city is the seat of an archbishop, has a museum and picture gallery, and several other valuable institutions. The university, founded in 1303, was abolished in 1794. Avignon has manufactures of paper, leather, silk, iron, &c., and is famous for its garden produce, its fruit, wine, honey, &c. The country about Avignon is delightful, and extremely fruitful in corn, wine, olives, oranges, and lemons. Pop. (1872) 38,196; (1886) 41,067. In Avignon, Petrarch spent several years; here, in the church of St. Clara, he first saw Laura. Vaucluse, which he has immortalised, lies 18 miles from Avignon. Avignon was the capital of the ancient *Cavares*, and presents many remains of the times of the Romans. In the middle ages, it formed, with the surrounding district, a county, which the popes, who had already received the county of Venaissin as a gift from King Philip III., bought in 1348 from Joanna, queen of Naples and Countess of Provence. The pope governed both counties through a vice-legate, and continued in the possession of them till 1790, when, after several stormy and bloody scenes, the city with its district was united with France. At the peace of Tolentino (1797), the pope formally resigned Avignon and Venaissin. Avignon is celebrated in ecclesiastical history as being for a time the residence of the popes. By order of Philip IV. of France, Pope Clement V. and six of his successors from 1309 to 1377, were obliged to reside there. It was afterwards (1378-1418) the residence of the French anti-popes. Two ecclesiastical councils were also held at Avignon (1326-37). A little cottage here was long the loved retreat of John Stuart Mill, the place where he died in 1873. Here, too, is a monument (1882) to the mechanician, De Girard.

Avila, a town of Spain, capital of the province of Avila, in Old Castile, situated at a height

of 3000 feet above the sea, at the base of the Sierra de Guadarrama, 71 miles N.W. of Madrid by rail. Avila has a fine Gothic cathedral, and a Moorish castle, and its massive granite walls still stand, 42 feet high and 11 broad, with 86 towers and 10 gateways. Its university, founded in 1482, was reduced to a college in 1807. Pop. now only about 9000, engaged in manufacturing cloth. Here St Teresa was born. The province is mountainous, but has fertile valleys. Its mineral wealth is still undeveloped; the chief produce is merino wool. Area, 2981 sq. m.; pop. estimated (1884) at 186,400.

Avila, GIL GONZALEZ D', born at Avila in 1577, died in 1658, was a royal historiographer for Castile, and wrote histories of several Castilian kings.

Avila y Zuniga, DON LUIZ DE, a Spanish general, diplomatist, and historian, born about 1490, enjoyed the favour and confidence of Charles V., who trusted him with embassies to the popes Paul IV. and Pius IV. He accompanied the emperor on his expedition against the German Protestant princes, and wrote an account of the war. The *Concudarios*, first published in 1547, were translated into several languages.

Aviles (anc. *Flaciquaria*), a seaport of Spain, close to the Bay of Biscay, 19 miles N. of Oviedo. There are coal and copper mines in the vicinity. Manufactures of earthenware, glass, linen, &c. are also carried on. Pop. (1878) 8979.

Avi'so (Span. *aviso*, 'advice,' 'intelligence'), a despatch-boat, a small swift vessel belonging to the navy; also used of a kind of torpedo-boat.

Avison, CHARLES, a musical composer, was born at Newcastle about 1710, and after studying in Italy, became organist at Newcastle, where he died in 1770. He wrote an *Essay on Musical Expression* (1752), in which he ranked the French and Italian composers above the Germans; and he composed sets of concertos and sonatas which were very popular for a time. He figures in Browning's *Parleyings with Certain People*.

Avizandum (late Lat. *avizare*, 'to consider,' 'to advise') formerly meant the report of a cause made by a Lord Ordinary to the Inner House of the Court of Session, when all causes were decided by the Inner House, and merely sent to the Ordinary for procedure. This practice survives only in the case of five different kinds of action. The word is also applied to the consideration which the Lord Ordinary now gives to a cause before pronouncing judgment. It is also used when a sheriff or other judge takes a case for private consideration outside the Court, and delays judgment.

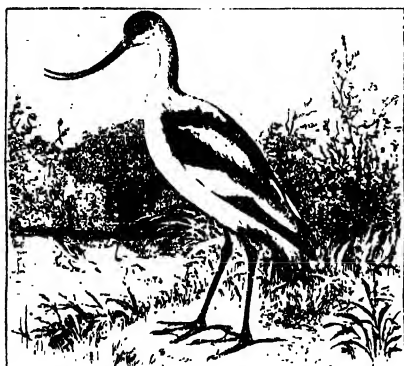
Avlona (Ital. *Falona*, anc. *Antona*), the best seaport in Albania, in the province of Janina, stands on an eminence near the Gulf of Avlona, an inlet of the Adriatic, protected by the island of Sasseno, the ancient Saso. It is one of the stations of the Austrian Lloyd steamers, and carries on considerable trade with Brindisi, &c. Pop. about 5000. The Christian inhabitants, who are chiefly Italians, are engaged in commerce, exporting oil, wool, salt, pitch, and especially some 40,000 tortoise-shells yearly. The Turks are employed in the manufacture of weapons and woollen fabrics. *Falonia*, a material imported to England for tanning, is the pericarp of an acorn grown in the neighbourhood. Up to 1691 the town belonged to the Venetians.

Avo'ca, or OVOCA (Celt. 'meeting of the waters'), a small river in the S.E. of County Wicklow, formed by the union of the Avonmore and Avonbeg, which rise in the hills of the centre of the county. The Avo'ca runs through a very picturesque vale only a quarter of a mile broad, with wooded banks 300 to 500 feet high, and after

a course of 9 miles reaches the sea at Arklow. A railway now extends through the vale, and connects a mining district with Wicklow and Dublin. The 'sweet vale' is celebrated in one of Moore's *Irish Melodies*. At Avondale, on the Avonmore, was born Mr C. S. Parnell.

Avoca'do Pear, or ALLIGATOR PEAR (*Persea gratissima*), a fruit-tree of the natural order Lauraceæ (q.v.), is a native of tropical America and the West Indies. The fruit is a drupe, but in size and shape resembles a huge pear; is usually of a brown colour, and has a soft or deep green pulp, not very sweet, but of a delicate flavour, which dissolves like butter on the tongue, and contains a large quantity of a fixed oil which is sometimes expressed for soapmaking and illuminating purposes. It is called *vegetable butter* in some of the French colonies. It is much esteemed in the West Indies, and often eaten with pepper and salt, or with sugar and lime-juice or spices. The seeds give a black stain, used for marking linen.

Avocet (*Recurvirostra*), a genus of birds, which, although having the feet webbed nearly to the end of the toes, is usually ranked among the Grallæ or Grallatores, on account of the length of the legs, the half-naked thighs, the long, slender, elastic bill, and the general snipe-like habit. They are distinguished from all other birds, except a few species of humming bird, by the strong upward curvature of the long slender bill, which is much like a thin piece of elastic



The Common Avocet (*Recurvirostra americana*).

whalebone, and adapted as a tactile organ for seeking food in the mud, as their webbed feet are for walking upon it, and their long legs for wading in the fens and marshes which they frequent. The wings are long and pointed; the tail short and rounded. They can move quickly along the ground, and fly swiftly and low. Swimming is only resorted to by accident or compulsion. They scoop through the mud with the bill, first to one side, and then to the other, in quest of worms and other small things. Audubon also observed the American Avocet taking insects which were swimming on the surface of the water, and expertly catching them in the air, running after them with partially expanded wings. The avocets are found in most parts of the globe. The Common Avocet (*R. americana*), about the size of a lapwing, is sometimes, though very rarely, found in the feney districts of England; it is a native of the continents of Europe, Asia, and Africa, occurring even at the Cape of Good Hope. Other species are natives of North America, India, and New Holland. The American Avocet (*R. americana*) has the bill less recurved than the Common Avocet.

Avoga'dro, AMADEO, was born in 1776, and died, professor of Physics at Turin, in 1856. He formulated his law as to the Atomic Theory (q.v.) in 1811.

Avoidance, in ecclesiastical law, signifies the vacancy of a benefice, or the fact of its being void of an incumbent. See BENEFICE.

Avoirdupois, or AVERDEPOIS, is the name given to the system of weights and measures applied in Great Britain and Ireland to all goods except the precious metals and precious stones and medicines. The word is derived from the old French *avoir de pois* ('goods of weight'), the *du* for *de* being a corruption; the word *avoir* or *avoir* being a noun meaning 'property,' 'goods.' The correct spelling is the form *avertdepois*, in use in the 17th century.

The grain is the foundation of the avoirdupois system, as well as of the troy. A cubic inch of water, at standard temperature, weighs 252.458 grains. Of the grains so determined, 7000 make a pound avoirdupois, and 5760 a pound troy (see WEIGHTS AND MEASURES). The avoirdupois pound is divided into 16 ounces, and the ounce into 16 drams. A dram, therefore, contains $27\frac{1}{2}$ grains, and an ounce $437\frac{1}{2}$ grains.

TABLE OF AVOIRDUPOIS WEIGHT.

27½ grains	are 1 dram	.....1 dr.
16 drams or drachms	" 1 ounce	.....1 oz.
16 ounces	" 1 pound	.....1 lb.
28 pounds	" 1 quarter	.....1 qr.
4 quarters	" 1 hundredweight	.....1 cwt.
20 hundredweight	" 1 ton	.....1 ton.

A cubic foot of water weighs 997.14 ounces avoirdupois, or nearly 1000 ounces, which gives an easy rule for determining the weight of a cubic foot of any substance from its specific gravity. Avoirdupois is the weight used in the United States of North America, where, however, a cwt., or *cental*, of only 100 lb. has come into general use, and a ton of 2000 lb.

Avola (*Abolla*), a seaport town on the east coast of Sicily, 13 miles SW. of Syracuse. It was destroyed by earthquake in 1693, but afterwards rebuilt. The famous honey of Hybla comes from this neighbourhood. There is tunny-fishing, a sugar-refinery, and some trade in agricultural produce. Pop. (1881) 12,286.

Avon, a word of Celtic origin, meaning 'river' or 'stream,' which seems allied to Aa (q.v.), and which is the name of several of the smaller British rivers. Of these may be noticed—(1) The Upper or Warwickshire Avon, which rises at Naseby in Northamptonshire, runs south-west through Warwickshire and Worcesterhire, passing Rugby, Warwick, Stratford, and Evesham, and joining the Severn at Tewkesbury. It has a course of 96 miles, and receives several tributaries, including the Swift from Lutterworth. Its pretty peaceful course, whose waves rolled Wyclif's ashes towards the sea, and saw the first flights of the 'sweet Swan of Avon,' is finely depicted in twenty-one etchings by Mr Heywood Sumner (Lond. 1881).—(2) The Lower, or Bristol Avon, which rises in North-west Wiltshire, and runs about 70 miles, first south in Wiltshire, and then west and north-west between Gloucestershire and Somersetshire. It traverses an oolitic basin, passing Bradford, Bath, and Bristol, and empties itself into the Bristol Channel. It is navigable for large vessels up to Bristol. It runs generally between deep banks in a rich valley. A canal through the middle of Wiltshire connects it with the Thames.—(3) The Wiltshire and Hampshire, or East Avon, which rises in the middle of Wiltshire, and runs south 70 miles through Wiltshire and Hampshire, passing Amesbury, Salisbury, and Ringwood, and

entering the English Channel at Christchurch. It is navigable up to Salisbury. It abounds in the small delicate loach. In Wales, two rivers named Avon—one rising in Monmouthshire, the other in Glamorganshire—fall into Swansea Bay. In Scotland there are several of the same name, affluents of the Spey, Clyde, and Forth.

Avonmouth, in Gloucestershire, at the mouth of the Avon, 6 miles NW. of Bristol, with which it is connected by the Bristol Port and Pier Railway. Here are a pier and extensive docks (1879), constructed for the railway company at a cost of £600,000.

Avanches (anc. *Abrincata*), a French town in the department of Manche, situated on the slope of a hill on the left bank of the Sée, near its mouth in St Michel's Bay, 37 miles E. of St Malo by rail. Till 1691 a bishop's seat, its former cathedral was built in the 18th century on the site of a cathedral consecrated in 1121, in which Henry II. received absolution for Becket's murder. Avanches has manufactures of lace, candles, and salt, and some trade in cider, grain, butter, cattle, &c. Pop. (1881) 7889.

Awe, Loch, an Argyllshire lake, with Loch Awe station and hotel near its foot, 22 miles E. of Oban. Lying 118 feet above sea-level, it extends 22½ miles north-eastward, varies in breadth between 3 furlongs and 3½ miles, covers 15½ sq. m., and has a maximum depth of 102 feet. The country around consists of mica-slate. The scenery is most striking at the north-east end—originally the head of the lake, where the water is studded with numerous wooded islets, overshadowed by towering and rugged mountains, prominent among which rises the dark and rocky ridge of Ben Cruachan, 3689 feet high, and 14 miles in circuit. Of the islets, the most noted are Fraoch-Eilean, containing the remains of a castle granted to Gilbert Macnaughton in 1267 by Alexander III.; and Inishail, with its ancient burying-ground, where in 1857 Mr Hanerton fixed his 'painter's camp.' On a rocky peninsula, in the north end of the lake, stands Kilehurn Castle, once a fortress of great strength, built about 1440 by Sir Colin Campbell of Glenorchy. The waters of the lake are carried off at its north-west end by the brawling river Awe, which, after a course of 5 miles, enters Loch Eive at Bunawe. The magnificent 'Pass of Brander,' through which the road and railway run beneath the shoulder of Ben Cruachan, was the scene of a conflict in 1308 between Robert the Bruce and the Macdougals of Lorn, in which that clan was all but exterminated. At the north-east end of the loch it receives the waters of the Orchy and Strae. Loch Awe contains fine fish, especially trout, *Salmo ferox*, and salmon; and the small villages of Cladich and Port Sonachan are the general resort of anglers. A steamer plies on the loch. From Loch Awe the Campbells took their 'slogan' or war-cry, 'It's a far cry to Lochow.'

Awn (*Arista*), in the flowers of Grasses (q.v.), a solitary pointed bristle, growing either from a glume or a palea. The flowers of some grasses are entirely *awnless*: in many, the glumes alone are *awned*, or only one of them; in others, the glumes are *awnless*, and the palea, or one palea, *awned*. The awn often appears as a terminal prolongation of the midrib of glume or palea: or it may separate below the point, and is then said to be *dorsal*; or may be jointed at the base, and free from the joint onwards. It may be straight or bent like a knee, or even twisted, and liable to change when moist. Sometimes it is rough, or even serrate, at the edges, as in barley; and sometimes feathery, as in feather-grass (*Stipa*),

where it is also remarkable for its great length. The characters of genera and species are often derived from the awn, but it is not always invariable, even in the same species, and the cultivated varieties of wheat and oats differ much in being more or less *bearded*. There appears to be a tendency to the diminution or disappearance of the awn through cultivation. See GRASSES.

Ax, a town in the French department of Ariège, lies at the foot of the Pyrenees, at the junction of three picturesque valleys, 74 miles SSE. of Toulouse. Pop. 1700. It is celebrated for its baths, and possesses the hottest sulphur-springs in the Pyrenees, to the number of 80, ranging in temperature from 77° to 172° F.

Axe, an instrument, usually of iron, edged with steel, for hewing timber and chopping wood. The haft or handle is of a length and size suitable for wielding with both hands, and is fitted into a head with an arching edge in the plane of the sweep of the tool the axe differing in this last respect from the adze, which is found in use amongst some uncivilised peoples that do not use axes at all. Similar instruments of smaller size, for use with one hand, are called hatchets (Fr. *hachette*, diminutive of *hache*, 'an axe'). The usefulness of the implement made it one of the first tools suggested by the needs of man, and, accordingly, among the very earliest archaeological relics we find almost invariably some form of axe. The stone axes of our own country are the same as those still in use in many islands of the South Pacific, and the Tomahawk (q.v.) of America finds a close parallel in the 'francisca,' a hatchet for throwing, at one time the national weapon of the Franks. These, and the bronze axes of England and Mexico, with the rough iron instrument of northern nations, all witness the primitive use of this weapon. The prehistoric axe is distinguished from a 'celt' proper (see CELT), which was a chisel, by a more complex shape, and by being bored or otherwise fitted for a handle. Within historic times, the axe has recovered its early importance with the progress of colonisation, and its importance to settlers has led to the invention of the American axe, which effects speedier results with the smallest expenditure of strength. The head of this axe is



The American Axe.

about nine inches long, and the arched head is somewhat broader than the back, while its sides are also convex. The principal advantage of this formation is that, as only part of the edge strikes the wood, on this spot all the force of the blow is concentrated; moreover, the convexity of the sides prevents the blade being caught fast, and facilitates its withdrawal. The handle, which is generally made of hickory or some other elastic wood, is rendered stronger and more elastic by its shape, resembling a half-strung bow. The manufacture of the axe includes more processes than might be supposed. After being cut to the requisite length, and the eye for the handle punched through it, it is pressed into shape between concave dies. With borax as a flux, the edge-piece of steel is now attached to a groove previously prepared, and several processes must follow, including welding, sharpening, tempering, polishing, and varnishing

with a mixture of turpentine and asphaltum, to prevent rust, before the finished instrument is ready for the market. A large quantity of these implements are manufactured in the United States, one establishment in Connecticut turning out almost 1000 daily. See also **BATTLE-AXE**, **HALBERT**, **LOCHABER AXE**.

Axel, or **ABSALON**, from 1177 Archbishop of Lund, and also minister and general to Valdemar I. and Canute VI. of Denmark, was born in 1128, and died at Sorø in 1201. He distinguished himself as well by wisdom and uprightness in peace, as by valour and address in war. The Wendish pirates were driven from the coasts of Denmark, and he defeated the Pomeranian prince, Bogislav. In the wise legislation of Valdemar and of his son, he had a great part. He favoured and promoted learning and art, and to his encouragement we owe the history of Denmark by Saxo Grammaticus. By building a castle, he laid the foundation of the future great city of Copenhagen, then an insignificant village.

Axestone, a variety of the mineral Jade or Nephrite (q.v.). It is of a greenish, grayish, or grayish-white colour, is more or less translucent, hard, tough, and not easily broken. It occurs in Silesia, in Central Asia and China, and in New Zealand and other islands of the Southern Pacific. It derives its name from the use to which it is put by the natives of these islands for making their hatchets. They also make eardrops of it.

Axholme, **ISLE OF**, a low level tract of North-west Lincolnshire, cut off by the Trent from the rest of the county. Measuring 18 by 5 miles, it was anciently a forest, but afterwards became a marsh, which was drained into the Trent in 1625 and succeeding years by Cornelius Vermuyden, a Dutchman, at a cost of £56,000. The reclaimed land became very fertile under Dutch and French Protestant settlers, but, after much litigation, it was in 1691 divided, the original inhabitants receiving 10,532 acres, and the settlers only 2868. In the *Saturday Review* for August 1, 1885, is a long and interesting account of the Isle of Axholme—the Mowbrays, its ancient lords; the wizard-hermit of Lindholme; and Epworth, the home of the Wesleys.

Axil (*axilla*), in Botany, the angle between the upper side of a leaf and the stem or branch from which it grows. Buds usually grow out from the stem in the axils of leaves, and this position is naturally termed *axillary*.—(2) In anatomical terminology, the axilla is the Armpit (q.v.).

Axim, an important station and port on the Gold Coast, a little to the E. of the mouth of the Ancebrak River. Inland from Axim, in the basin of that river, and in the district between it and the Prai, gold-mining operations have recently been carried on to a large scale. See Burton and Cameron, *To the Gold Coast for Gold* (1882).

Axinomancy (Gr. *axini*, 'an axe, and *manteia*, 'divination'), a mode of divination much practised by the ancient Greeks, particularly with the view of discovering the perpetrators of great crimes. An axe was poised upon a stake, and was supposed to move so as to indicate the guilty person, or the names of suspected persons being pronounced, the motion of the axe at a particular name was accepted as a sign of guilt. Another method of axinomancy was by watching the movements of an agave placed upon a red-hot axe. This is only one of a multitude of analogous modes of divination practised in all ages and among all nations. See **DIVINATION**, and **DIVINING ROD**.

Axiom, a Greek word meaning a 'decision' or 'assumption,' is commonly used to signify a general

proposition which the understanding recognises as true, as soon as the import of the words conveying it is apprehended. Such a proposition is therefore known directly, and does not need to be deduced from any other. Of this kind, for example, are all propositions whose predicate is a property essential to our notion of the subject. Every rational science requires such fundamental propositions, from which all the truths composing it are derived; the whole of geometry, for instance, rests on comparatively a very few axioms. Whether there is, for the whole of human knowledge, any single, absolutely first axiom, from which all else that is known may be deduced, is a question that has given rise to much disputation; but the fact that human knowledge may have various starting-points answers it in the negative. Mathematicians use the word axiom to denote those propositions which they must assume as known from some other source than deductive reasoning, and employ in proving all the other truths of the science. The rigour of method requires that no more be assumed than are absolutely necessary. Every self-evident proposition, therefore, is not an axiom in this sense, though, of course, it is desirable that every axiom be self-evident; thus, Euclid rests the whole of geometry on fifteen assumptions, but he proves propositions that are at least as self-evident as some that he takes for granted. That 'any two sides of a triangle are greater than the third,' is as self-evident as that 'all right angles are equal to one another,' and much more so than his assumption about parallels (see **PARALLELS**). Euclid's assumptions are divided into three 'postulates' or demands, and twelve 'common notions;' the term axiom is of later introduction. The distinction between axioms and postulates is usually stated in this way: an axiom is 'a theorem granted without demonstration;' a postulate is 'a problem granted without construction'—as, 'To draw a straight line between two given points.'

Axis, a genus of deer, abundant on the banks of the Ganges, but found throughout India and in many islands of the Eastern Archipelago. It was known to the ancients by the name *Axis*. One of its Indian names is *Chitra* or *Cheetal*, and by British sportsmen in India it is often called the Spotted Hog deer, though that name is also given to a rarer species. The axis has a great resemblance in size and colouring to the European fallow-deer; it is generally of a rich fawn colour, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns, however, differ very much from those of the fallow-deer, being slender, sharp-pointed, little branched, and not at all palmate. The female has no horns, and is lighter in colour than the male. The axis frequents thick jungles in the vicinity of water, and feeds during the night. Its spots facilitate concealment in the interrupted light of jungle life. It is commonly found in herds of 15 or 20, of which 3 or 4 are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to get within range. The males, however, sometimes exhibit great courage in defence of the young. It is gentle and very easily domesticated, has been frequently imported into Europe, and breeds freely, when kept in parks, in Britain and France.

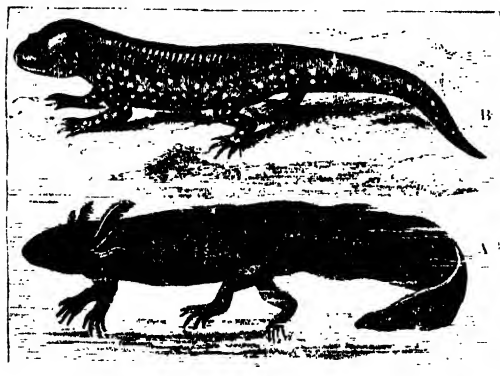
Axis, in Geometry. The axis of a curved line is formed by a right line dividing the curve into two symmetrical parts, so that the part on one side exactly corresponds with that on the other; as in the parabola, the ellipse, and the hyperbola. The axis of any geometrical solid is the right line which passes through the centre of all the corresponding parallel sections of it: in this sense, we speak of

the axis of a cylinder, a globe, or a spheroid. By the axis of rotation, we understand the right line around which a body revolves.—In physical science, the axis of a *lens* is the right line passing through it in such a manner as to be perpendicular to both sides of it; and the axis of a telescope is a right line which passes through the centres of all the glasses in the tube. The axis of the *eye* is the right line passing through the centres of the pupil and the crystalline lens.

Axis, in Botany, a term applied to the central portion of the higher plants (higher cryptogams as well as phanerogams), which bears the appendages or lateral members arranged upon it. Those plants in which no distinction of axis and appendages can be made out are termed *Thallophytes*, and include algae, lichens, and fungi. The stem is called the *ascending axis*; the root, the *descending axis*. In the germinating seed, these are distinguished as plumule and radicle. The terminal part of an axis bearing the reproductive organs in flowering plants is called the *floral axis*. This is usually a very short portion, but may be elongated, broadened, hollowed, &c. The notion of a flowering plant as simply an axis with more or less modified appendages serving different purposes, as sepal, leaf, petal, stamen, carpel, &c., is older than Linnaeus, but was first clearly grasped by the embryologist Wolff, and even more systematically at a later date (1790) by the many-sided poet Goethe. In describing animal forms it is customary to define the disposition of the parts in reference to certain axes, lateral, dorso-ventral, radial, &c. (see MORPHOLOGY). The term *axis* is specially applied in human anatomy to the second vertebra of the neck (see SPINAL COLUMN).

Axminster, a small old town of Devonshire, on the left bank of the Axe, 27 miles E. of Exeter by rail. The parish church, originally cruciform, retains a good Norman doorway. From 1755 till 1835 Axminster was famous for the manufacture of Turkey and Persian carpets (see CARPET). Dr Buckland was a native. Pop. (1881) 2500. See Pulman's *Book of the Axe* (1875).

Axolotl (the Aztec word), an amphibian form occurring abundantly in some Mexican lakes, and found widely distributed in the Western United States. It used to be ranked among the forms which permanently retain their gills (*Perennibranchiata*), but more complete observation has shown that it develops into a gill-less adult form (*Amblystoma*) like a salamander. Both forms



A, Axolotl; B, Amblystoma.

were known for some time before Dumeril in 1865 observed the passage of the gilled axolotl into the gill-less *Amblystoma*. Maria Chauvin and others have confirmed the discovery. The dry

saline character of the shore of some of the lakes apparently prevents the gilled axolotls in these cases from leaving the water and becoming lung-breathing adults, while in other instances drying up has doubtless acted as a condition forcing them to the adult mode of respiration. Thus the axolotl of Lake Como on the summit of the Rocky Mountains is said to be always transformed into *Amblystoma*, while in other cases the larval form seems to persist if the external conditions be favourable for breathing by gills. The axolotl is plump and short-legged, from 8 to 10 inches in length, of a dark colour with spots, and with the common amphibian character of slightly changing its colour (see CHROMATOPHORES). It bears three feathery gills on each side of its neck. Though in one sense larval, it is nevertheless sexually mature. It is esteemed a delicacy in Mexico. See AMBLYSTOMA.

Axum, once capital of an Ethiopian kingdom, is now in the modern Abyssinian province of Tigré, and lies mainly in ruins. Pop. 2000. The former greatness of the city is testified by yet remaining structures cut in granite, of which the most notable are a church, broken columns, and a great obelisk. Some of the ruins bear inscriptions, from which it appears that the Axumite empire extended over Abyssinia, and even over Yemen and Saba in Arabia, and possessed the command of the Red Sea. This country was the farthest point southward that Greek civilisation reached. Under King Aizanes (4th century), Christianity was introduced into the country from Egypt by the two apostles Frumentius and Edesius. The new doctrine soon spread over the whole country; Frumentius was made the first Bishop of Axum, and the Axumite form of the language became the ecclesiastical language of Abyssinia. The Axumite empire formed the outermost bulwark of Christianity; and, as such, in its interference in behalf of the Christians in Arabia, it became the natural antagonist of Mohammedanism. The contests in which it soon became involved with that power caused its fall.

Ayacucho, formerly Huamanga or Guamanga, a town in the Peruvian department of the same name, 220 miles ESE. of Lima. Founded by Pizarro in 1539, it is now a handsome and thriving town. Here, on the 9th December 1824, the combined forces of Peru and Colombia (the latter then comprising Ecuador, New Granada, and Venezuela) totally defeated the last Spanish army that ever set foot on the continent. Pop. 9387.—The department of Ayacucho has an area of 24,213 sq. m., and a population of 142,000. It consists of elevated plains and deep valleys; agriculture and bee-keeping are the chief industries.

Ayala, PEDRO LOPEZ DE (*El Vero*), was born at Murcia in 1332, of one of the first Castilian families. A brave soldier and able statesman, he filled some of the leading offices under several kings of Castile, and died in 1497. But Ayala's truest title to fame is his *Cronicas de los Reyes de Castilla* (best ed. 1780), which contains the history of Castile from the middle to the end of the 14th century. His *Rinado de Palacio*, begun during his captivity in England (1367), is a didactic and satirical poem of some value.—ADELARDO LOPEZ DE AYALA (1829-79) was likewise a poet and statesman.

Ayamonte, a fortified town of Andalusia, Spain, on the left bank of the Guadiana, and near its mouth. Fishing and silk-weaving are carried on. Pop. 4478.

Ayasuluk, a village on the site of the ancient Ephesus (q.v.).

Aye-aye (*Cheiromys madagascariensis*), a rare and aberrant member of the Lemur family (q.v.).

It inhabits the woods of Madagascar, and was first noted in 1780 by Sonnerat, who was said to have given it the name Aye-aye in reference to the astonished exclamation of some natives when they saw the first specimen of the curious creature



Aye-aye (from Owen).

caught by a European. But more probably the name is onomatopoeic, derived from the cry of the animal, *Hai-hay (Hi-hi)*. It was for long a puzzle to zoologists: Buffon placed it beside squirrels, and Cuvier was also inclined to regard it as a rodent. It was carefully described by Owen in the *Transactions of the Zoological Society*, 1866, and since the publication of this beautiful and exhaustive memoir, there has been no doubt as to the position of the aye-aye as an aberrant lemur.

It is about the size of a cat, with thick, dark hair; long, bushy, flexible tail; large naked ears, quick to detect the faintest sound; big, well-protected eyes, suited for its exclusively nocturnal and arboreal



Head and Fore-feet of Aye-aye on large scale.
(From Owen.)

labours; rodent-like front teeth, with which it gnaws the branches in search of boring insects; and above all, a peculiar, spidery, hairy hand, with an extremely slender, almost wire-like, third finger, which looks as if it were paralysed, but is used in detecting and picking out the favourite wood grubs. Other characters of the unique hand will be seen in the figure. Its zoological position may be stated as that of a divergent offshoot from a primitive and generalised lemur type with many rodent affinities. It sleeps all day, wrapped in its bushy tail, and often within a nest in a tree-cleft; it is

very active at night, creeping along the branches with plaintive grunts, holding firm by its hind-feet, and tapping and probing with its fingers every here and there when its quick ear detects the presence of grubs. It also feeds on fruits, bamboo-pith, sugar-cane juice, and the like, and uses its long fingers very dexterously for drinking purposes. The natives of Madagascar regard this curious animal with superstitious reverence; and its peculiar structure and habits make it one of the most interesting of mammals.

Ayeshah (also *Aysha* or *Aisha*), the favourite wife of Mohammed, and daughter of Abu-Bekr, was born at Medina about 610 A.D.; and was only nine years of age when the Prophet married her. She was the only one of Mohammed's wives who accompanied him in his campaigns. Although Ayeshah bore no children to Mohammed, she was tenderly beloved by him. She was accused of adultery, but Mohammed produced a revelation from heaven (now in the Koran) to the effect that she was innocent. Mohammed expired in her arms (632). She now successfully exercised her influence to prevent Ali, the Prophet's son-in-law, from becoming calif, and secured the succession for her father, Abu-Bekr. Again on Othman's death she headed a force to resist the accession of Ali, but the troops under her were in 656 defeated by Ali, and she was taken prisoner. She died at Medina (677 A.D.), highly venerated by all true Mussulmans, and named the *Prophetess* and the *Mother of Believers*.

Aylesbury, the chief town of Buckinghamshire, in a fertile vale, on a rivulet flowing to the Tame, 43½ miles NW. of London. Among its buildings are the cruciform parish church, finely restored by Sir G. G. Scott (1849-67), the corn exchange and markets (1865), and the county infirmary (1862). The inhabitants are engaged in making bone-lace and straw-plait, in brewing, in the preparation of dairy-produce, and in rearing fat ducks to supply the London markets at an early period of the season, when they fetch very high prices. Aylesbury is a very ancient town, having been taken from the Britons by the Saxons in 571. Till 1885 it formed with its hundred a parliamentary borough, returning two members to parliament. Pop. of town (1881) 7795.

Aylesford, a village near the centre of Kent, on the right bank of the Medway, 3½ miles NW. of Maidstone. Remarkable ancient remains are found here, including the cromlech, called Kits Coty House (q.v.): a small truncated pyramidal chamber, open in front, and formed of four large rude blocks, three of which are uprights, and the fourth laid on them. Pop. of parish (1881) 2719.

Aylmer, JOHN, Bishop of London, was born in 1521 at Aylmer Hall, Tivetshall St Mary, Norfolk, and in 1541 graduated B.A. of Cambridge. Taking orders, he became tutor to Lady Jane Grey; in 1553 was installed Archdeacon of Stow; in 1562, of Lincoln, having lived abroad during the Marian persecution; and finally, in 1577 was consecrated Bishop of London. Under the designation of 'Morrell,' he is described in Spenser's *Shepherd's Calendar* as the 'proude and ambitious pastoure,'—a fair enough estimate of one who showed equal rigour to Catholics and Puritans, and was always quarrelsome and arbitrary. He died 3d June 1594.

Aymestrey Limestone, a well-marked horizon in the Ludlow group of the Silurian system. It is a somewhat dark-gray concretionary rock, consisting of thin beds which attain a united thickness in places of 150 feet. It is well developed at Aymestrey, in Herefordshire, near Loominster, but thins off entirely at no great distance from that place. One of its most characteristic fossils is *Pentamerus knightii*, a brachiopod.

Aymon, or **HAIMON**, Count of Dordogne, whose sons, Alard, Richard, Guichard, and Renaud, were the chief heroes of one of the finest romances of the Carolingian cycle. The story seems to be originally French, and the first known work in which it is found is the poem, *Regnaut de Montauban*, by Hnau de Villeneuve, written before 1200. It occurs in a prose collection of similar stories, published at Lyons about 1480, an English translation of which, most likely by Caxton himself, was printed about 1489 (reprinted from unique imperfect Althorp copy for Early English Text Society, 1884 85). The current German story which Tieck worked up, does not appear to be from the French original, but rather borrowed from a Dutch source. Ariosto's *Roland* has seened the brothers a more certain immortality in the part given to Renaud, the youngest and traditionally the bravest of the four.

Ayr, the county town of Ayrshire, at the mouth of the river Ayr, 40½ miles SSW. of Glasgow by rail. It is a clean and handsome town, the principal streets well built; while to the south, towards the racecourse, many elegant villas have sprung up of recent years. The Town's Buildings, with a spire 226 feet high, were erected in 1828, and greatly enlarged in 1881. The so-called 'Wallace Tower' is a Gothic edifice of 1834, 113 feet high. There are also the County Buildings, modelled after the temple of Isis in Rome, and the Academy (founded 1764; new building, 1880). Three bridges span the river, and connect Ayr proper with Newton-upon-Ayr and Wallacetown—a railway viaduct, and the 'Two Brigs' of Burns. Of these the narrow four-arched 'Auld Brig' dates probably from the end of the 15th century, and the 'New Brig' (1788) was rebuilt in 1879. There are bronze statues of General Smith Neill and the thirteenth Earl of Eglinton, erected in Wellington Square. Part of the tower of the old church of St John, built in the 12th century, and turned into a fort by Cromwell, is still standing. The harbour is formed by the estuary of the river, and protected by piers and a breakwater; improvements on it, including a wet dock and slip dock, have been carried out since 1874 at a cost of more than £150,000. The trade is a large and growing one, the tonnage of vessels entering the port having increased in ten years from 140,000 to 328,000. The chief export is coal from the Ayrshire collieries. A considerable quantity of grain and timber is imported; and there are manufactures of lace and woollen fabrics, carpets, large saw-mills, &c. A splendid new water-supply, drawn from Loch Finlas, 20 miles distant, was introduced in 1887. At an early date Ayr was a commercial and military place of some importance. William the Lion made it a royal burgh about 1200. During the War of Independence, it formed a regular centre of military operations, and in 1297, while in possession of an English garrison, it was the scene (according to Blind Harry) of the burning by Wallace of the 'Barns of Ayr.' The principal objects of interest near Ayr are connected with the memory of Robert Burns (see **ALLOWAY**). Ayr unites with Campbeltown, Irvine, Inveraray, and Oban in sending a member to parliament. The municipal burgh was in 1873 rendered continuous with the parliamentary, so as to take in Newton and Wallacetown, and was again extended in 1885. Pop. of parliamentary burgh (1841) 15,749; (1861) 18,573; (1881) 20,821; (1891) 23,835.

Ayrshire, a large maritime county in the SW. of Scotland, washed on the W. by the Firth of Clyde and the North Channel. Its greatest length is 78 miles; its greatest breadth, 28; and its area is 1149 sq. m., or 735,262 acres, it being seventh in size of the Scottish counties. The

general aspect of the county is undulating and hilly, the land attaining no great elevation, except a small portion in the north, and some considerable tracts in the south and south-east, which are mountainous. None of the eminences exceed 2520 feet, which is the height of Shalloch on Minnoch. Loch Doon (5½ mile) is much the largest of several fresh-water lakes; whilst the chief rivers—only 20 to 38 miles long—are the Ayr, with its tributary the Lugar, and the 'bonny' Doon, which flow across the centre of the county; the Garnock and Irvine in the north; and the Girvan and Stinchar in the south. To Ayrshire belong, too, the first 16 miles of the Nith, which passes off into Dumfriesshire. To the south of the Girvan the rocks are chiefly Silurian; to the north of it are patches of old red sandstone and carboniferous strata, with both of which igneous rocks are commonly associated. Ayrshire is rich in valuable minerals, especially coal, ironstone, limestone, and freestone. The other minerals have long been wrought, but it was from 1850 that the iron trade rose to great importance, again to decline since 1880. On the banks of the Ayr is found an excellent species of whetstone, called Water-of-Ayr Stone. The climate of Ayrshire is mild and healthy. The soil along the coast is light and sandy, interspersed with deep loam; the most fertile districts are in the centre of the county, where clay predominates. On the east side are extensive mosses and moorlands. The three ancient divisions of the county are: Carrick, south of the Doon, mostly wild and hilly; Kyle, between the Doon and the Irvine, containing much rich level land, though towards the coast the soil is lighter and less productive; and Cunningham, comprising all the country north of the Irvine, mostly fertile. Agriculture till 1800 was very backward; but since then extraordinary progress has been made in draining, improved rotation, and road-making; while the condition of the cottars has been much improved. There is a great trade in early potatoes. The percentage of cultivated area is 43·2, that of all Scotland being 23·5; and 22,177 acres are under wood. The farms are generally small. Dairy-husbandry is carried to high perfection in Ayrshire, the breed of milk-cows, of which it rears a greater number than any other Scotch county, being noted as the finest in the kingdom for the quantity and quality of their milk. The Dunlop cheese, so called from the parish of that name, was almost as celebrated as Stilton, but since 1855 has been almost superseded by that made on the Cheddar process. The breed of horses is also excellent. Manufactures, especially woollen and cotton, are carried on to an important extent. There are extensive cotton-works at Catrine; at Kilmarnock, iron-foundries, carpet, bonnet, and tweed factories; dynamite and chemical works near Saltcoats; and at Galdston and Newmilns much lace is manufactured. Of the minor manufactures, the most characteristic is that of ornamental wood-work, often bearing tartan designs, which is extensively carried on at Mauchline. Great iron-works exist at Muirkirk, Hurlford, Kilwinning, Kilbirnie, Ardler, Dalry, and Dalnellington. Ayr and Maybole manufacture shoes and agricultural implements in very large quantities. There are valuable fisheries on the coast, whose headquarters is Ballantrae. Troon, Ardrossan, and Ayr are thriving ports. Pop. (1801) 81,207; (1881) 217,504; (1891) 224,222. Ayrshire returns two members to parliament. The chief towns, besides Ayr, are Kilmarnock, Girvan, Maybole, Dalry, Kilwinning, Beith, Irvine, Stewarton, Old Cumnock, Ardrossan, Saltcoats, Troon, Mauchline, Galdston, Newmilns, Kilbirnie, and Largs. Of antiquities, the most interesting are the ruins of Crossraguel and Kilwin-

ning Abbeys; of 'Alloway's haunted kirk,' with the 'auld clay biggin,' Burns's birthplace, hard by; and of the castles of Turnberry (the family seat of Robert the Bruce), Dumre, Loch Doon, Dean, Dumbold, &c. Ayrshire was inhabited in the time of Agricola by the Damnonii, with whom were afterwards mixed the Scots from the opposite coast of Kintyre. It contains the battlefields of Largs and Loudon Hill; and during the religious persecutions of the Stuarts, it was a stronghold of the Covenanters. See James Paterson's *History of Ayrshire* (2 vols. 1847-52), and A. Millar's *Castles and Mansions of Ayrshire* (1855).

Ayrer, JACOB, next to Hans Sachs the most prolific and important German dramatic writer of the 16th century. His history is involved in obscurity; but it is known that he was a citizen of Nuremberg in 1591, and a procurator in the courts of law. His rhyming chronicle of the town of Bamberg was edited by I. Heller in 1838. It was not till after his death, in 1695, that a collected edition of his dramatic pieces was published under the title *Opus theatricum*, consisting of sixty-six tragedies, comedies, and carnival plays (Nurem. 1618). He took his subjects from history, legend, and novels; some pieces are based on English plays. Ayer has the same garrulous breadth of dialogue as Hans Sachs, but is inferior to him in wit and humour. See K. Schmitt, *Jacob Ayer* (Marburg, 1851).

Ayton, SIR ROBERT, Scottish poet, was born at Kinaldie, Fife, in 1570, and entering St Leonard's College, St Andrews, in 1581, took his M.A. degree in 1588. For purposes of study he next visited France, whence he 'dressed, in 1603, an elegant Latin panegyric to King James, on his accession to the throne of England. This poem was the making of Ayton's fortune, for we find him appointed, successively, a gentleman of the bedchamber, private secretary to the queen, and master of requests - posts all continued to him in the following reign. He was knighted in 1612, and employed to convey copies of King James's *Apology for the Oath of Allegiance* to the German courts. Ayton was on terms of familiarity with all the poets, wits, and philosophers of his time - among others, Hobbes and Ben Jonson. He was himself a poet of considerable merit; but, unfortunately, a large number of his effusions being complimentary verses to his friends, are characterised by conceit and extravagant flattery. He was one of the first Scotsmen who wrote in English with any degree of elegance and purity. 'I do confess thou'rt smooth and fair,' and the prototype of 'Auld Lang Syne,' have been ascribed to him, but on scant authority. He died at Whitehall Palace, February 1638. See his *Poems*, with a Memoir by Dr Charles Rogers (1871).

Aytoun, WILLIAM EDMONDSTOUNE, born in Edinburgh, 21st June 1813, was educated at the Academy and the university, and for some months studied German at Aschaffenburg. In 1835 he became, like his father, a Writer to the Signet, and in 1840 was called to the Scottish bar. To his mother he owed his love of ballad-lore and Jacobitism, and, taking early to literary work, he entered in 1836 on his lifelong connection with *Blackwood's*; in 1845 was appointed professor of Rhetoric and Belles-Lettres in Edinburgh University, and in five years increased the number of his hearers fivefold. In 1849 he married a daughter of Professor Wilson; in 1852 was made sheriff of Orkney; and next year received from Oxford the honorary degree of D.C.L. His first two published works--*Poems*, *Harper*, and *Other Poems* (1832), and *The Life and Times of Richard I.* (1840), were succeeded in 1848 by *Lays*

of the Scottish Cavaliers, which established his reputation as a poet of the school of Sir Walter Scott, and which has run through thirty editions. The *Bon Gaultier Ballads*, a series of capital parodies (1855), were produced conjointly with Theodore Martin, as also were *Poems and Ballads of Goethe* (1858). Other works by him were *Firmilian*, a *Spasmodic Tragedy* (1854), which is almost too good for a parody; *Bothwell*, a long narrative poem in the measure and manner of Scott; an edition of the *Scottish Ballads* (2 vols. 1858); and *Norman Sinclair* (1861), a semi-autobiographical novel. Ayton was successful in quite opposite branches of literature—at once as a poet and humorist. His poems exhibit a ballad-like simplicity, and a fiery flow of narration; while his tales possess a certain robust humour and farcical abandonment. His poetical powers appear in their greatest perfection in the *Lays of the Scottish Cavaliers*; the special merits of his humour in *The Glenmichkin Railway* and *How I became a Yeoman*. As a critic, he took up the knout of 'Christopher North,' which he wielded with no little force and dexterity. He died at Blackhill, near Elgin, 4th August 1865. See his Life by Sir Theodore Martin (1867).

Ayuntamiento is the name given in Spain to the councils or governing bodies of towns. Sprung from the institutions of the Romans, and finally established during the long struggles with the Moors, the ayuntamientos acquired great influence and political power, the nobility being admitted to them without their class privileges. Although this importance was gradually impaired, and under the Bourbons the last shadow of municipal freedom was lost, the remembrance of it continued to be cherished by the people. Accordingly, the cortes, in 1812, adopted the leading features of the former system. On the return of Ferdinand VII., the ayuntamientos were abolished; restored in 1823; after the invasion by France, once more set aside; and again restored in 1837. The ayuntamiento, with the alcalde as president, was appointed by the free choice of the people. The government could provisionally annul its acts, but must afterwards procure the ratification of the cortes. The ayuntamientos were empowered to make up the lists of electors and jurors, to organise the national guards, to command the police within their own bounds, to direct the apportionment and raising of taxes, and to manage the funds of the commune. Subsequently they have been more than once modified, not without opposition, especially after the events of 1843. The municipal law of 1870 deprived them of all political authority, and regulated them as administrative bodies, subject in certain respects to the authorities of the provinces, the law courts, and the cortes.

Ayuthia, the ancient capital of Siam, stands on the Menam, 50 miles N. of Bangkok. It was founded in 1357, and was the capital until 1767, when it was sacked and half destroyed by the Burmese. In the 16th century it was three leagues in circumference, and was till recently the second city of the kingdom. It is now called Krung-Krao, and is mainly built in piles over the water. Some magnificent buildings still remain, now crumbling into ruins and overgrown with luxuriant vegetation; notable amongst them are Buddhist temples, especially the 'Golden Mount,' 400 feet high.

Aza-lea, a genus of the heath order (Ericaceæ), and distinguished from *Rhododendron* (q.v.) chiefly by the flowers having five stamens instead of ten. Most of the species of azalea also differ from the *rhododendrons* in having the leaves thin and deciduous instead of evergreen. Perfectly intermediate

forms have now been discovered, and by classifiers the two genera are therefore united under rhododendron; the distinction, however, remains one of practical convenience. One of the species best deserving of notice is *A. pontica*, a shrub from 3 to 5 feet high, a native of Asia Minor, with lanceolate shining leaves and umbellate yellow flowers, which are externally covered with glutinous hairy glands, and are very fragrant. It may be regarded as, like many of the other Ericaceæ (heaths, &c.), a social plant; and its golden flowers give great brilliancy to the landscape in many parts of the Crimea, the south-east of Poland, the Caucasus, &c. It covers many mountain slopes, but does not ascend to great elevations, giving place to the more alpine *Rhododendron ponticum*. It is common in gardens and shrubberies in Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous, and the honey collected by bees from its flowers, which greatly abound in honey, is said to cause stupefaction and delirium, as happened to Xenophon's soldiers in their famous retreat in Asia. —North America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Britain, particularly *A. nudiflora* and *A. viscosa*, which, with *A. pontica*,



Flowering branch of Azalea (*A. indica* 'ora').

have become the parents of many hybrids. Both have nearly white flowers, very beautiful, and of delicious fragrance. *A. viscosa* has the flowers covered with glutinous hairs like *A. pontica*; but the flowers of *A. nudiflora* are nearly destitute of them. Both species abound from Canada to the southern parts of the United States. They are taller shrubs than *A. pontica*. Upon account of its sweet smell, *A. nudiflora* is called in America the Upright Honey-suckle. *A. canadensis*, a native of the southern parts of the United States, is described as frequently clothing the mountains with a robe of living scarlet. —India and China produce several species of azalea, of which one of the finest is *A. indica*, well known in Britain as a greenhouse shrub. Its leaves are persistent, and its flowers exhibit great brilliancy of colours. Many hybrids exist between the more hardy species and this. Another extremely beautiful species is *A. liliflora*, an evergreen, which has been introduced into Britain from China, and is said to be quite hardy.

A diminutive, procumbent, evergreen heath, a native of alpine regions in Europe and North America, plentiful on high mountains in Scotland, was long known as *A. procumbens*, but is now called *Loiseleuria procumbens*. The flowers are small, solitary, and rose-coloured. The whole habit of the plant widely differs from that of the ordinary azalea.

Azamgarh, or AZIM'S FORT, a town in the North-west Provinces of India. The town is situated on the river Tons, 81 miles N. of Benares. It was founded in 1665 by Azam Khan, a large landholder in the neighbourhood. The Europeans here were compelled to flee during the Mutiny of 1857; the native infantry murdered their officers, and carried off the treasure to Fyzabad. Pop. of town, 16,000, of whom about 10,000 are Hindus, the rest Mohammedans.—The district of Azamgarh in the Benares division, is low and remarkably level. The soil is fertile, excepting that tracts, amounting to more than a quarter of the whole, are irreclaimably barren, from being impregnated with soda, nitre, and other saline substances. Magnificent crops of rice, sugar-cane, and indigo are produced. Sugar, molasses, indigo, opium, and coarse cloths are the chief exports; the Gogra River forming the principal highway for trade. Area of district, 2147 sq. m.; pop. (1872) 1,531,482; (1881) 1,604,654, or about 747 persons per sq. m., which is a high average. In religion about 1½ millions are Hindus, and 200,000 Mohammedans.

Azazel, a name occurring in Leviticus xvi., in the account of the rites of the Day of Atonement, explained by some as the 'scapegoat' which was led out into the wilderness laden with the sins of the people; by others, with much greater likelihood, as a designation of the being to whom the goat was sent. Satan, according to Hengstenberg, or a demon of the pre-Mosaic religion, according to Ewald.

Azeglio, MASSIMO TAPARELLI, MARCHESE D', famous as an artist, a publicist, a romance-writer, and a statesman, was the descendant of an ancient and noble family of Piedmont. He was born in 1798 at Turin, where his father held a high military position. In his fifteenth year, he followed his father to Rome, where he had been appointed ambassador, and there became passionately devoted to the fine arts; but had to accept an appointment in a Piedmontese cavalry regiment. Here he devoted his leisure with such intensity to scientific pursuits, that he brought on an illness which forced him to quit the service. After some difficulty, he got his father's permission to devote himself entirely to painting. A year had hardly elapsed ere Azeglio had made himself a name in Rome as a landscape-painter. On the death of his father in 1830, he went to Milan, and made the friendship of Alessandro Manzoni, whose daughter he married. He now began to make himself favourably known also in literature, his novels, *Ettore Fieramosca* (1833) and *Niccolò de' Lupi* (1841), having done much to fan the national spirit of the Italians. The political affairs of Italy soon occupied him exclusively; he traversed the provinces, cities, and villages, seeking to stir up the spirit of patriotism, and to conciliate the unhappy party divisions, and was everywhere received with rejoicing and acclamation. Azeglio never belonged to a secret political society, but opposed conspiracies as mischievous, and exhorted the impatient to moderation. While in Florence, he wrote his famous piece, *Degli ultimi casi di Romagna*, in which he lashed the miserable papal government, denounced the vain attempts at insurrection, and proved to the Italian princes the necessity of a national policy. After the election of Pius IX. as pope, he returned to Rome, and to his influence were ascribed the reforms with which Pius began his government. When Charles Albert, after the rising of Lombardy, crossed the Ticino, Azeglio left Rome with the papal troops destined to support the Italian contest. In the battle of Vicenza, where he commanded a legion, he was severely wounded. Scarcely was he recovered,

when with his pen he courageously opposed the republican party, now intoxicated with victory. On the opening of the Sardinian parliament, he was chosen a member of the Chamber of Deputies. After the unfortunate event of the battle of Novara, the young king, Victor-Emanuel II., appointed him (1849) president of the cabinet, and his influence in this high position was most beneficial. At the close of the war in 1859, Azeglio was for a time military commissioner extraordinary for the Roman States. On his retirement he issued a proclamation to the people, which greatly tended to strengthen their resolution by its noble yet temperate advice. He died 15th January 1866. He wrote many works, mainly on public questions, and his political correspondence and an autobiographical work, *Intimi Ricordi*, were published after his death. See the Lives by Pavesio (1871) and Bianchi (1884).

Azerbaijan', or ADERBAIJAN, the ancient *Media Atropatene*, is the north-western province of Persia, bounded S. by Persian Kurdistan and Irak, E. by Ghilan, N.E. and N. by Russian territory, and W. by Turkish Kurdistan. It has an area of about 40,100 sq. m., and a pop. of 2,000,000. The surface of Azerbaijan is very mountainous, many of the ranges rising from 7000 to 9000 feet in height. The peak of Savalan (an extinct volcano), near Ardebil, reaches an elevation of over 13,000 feet. Mount Ararat rises on the north-west border. The chief rivers are the Aras or *Araxes*, the Kara Su, and the Kizil-Uzen. The salt lake Urmia (q.v.), the largest in Persia, is situated near the western border of the province. The climate of Azerbaijan is not unhealthy, but it is subject to rapid extremes of heat and cold. In the mountainous districts, the hail-storms are occasionally so violent as to kill cattle. The principal products are rice, barley, wheat, maize, flax, hemp, cotton, tobacco, honey, and saffron; camels, horses, cattle, and sheep are also reared; velvet, silks, stuffs, carpets, woollens, and leather are the most important articles of manufacture, and a little is done in hardware. Lead, iron, copper, sulphur, saltpetre, and salt are found in the province. The capital is Tabriz; other towns being Urmia, Maragha, Mian, Khoi, Selmas, and Ardebil.

Azimuth. The azimuth of a heavenly body is the angle measured along the horizon between the north or south point, and the point where a circle, passing through the zenith and the body, cuts the horizon. It is usual to measure the azimuth westward from the point most remote from the elevated pole, beginning at 0°, and returning to it at 360°. Thus, in northern latitudes, where the north pole is elevated, the azimuth is measured from the south point, so that the east point, for instance, has an azimuth of 270° (see ARMILLARY SPHERE). The azimuth circles are those which extend from zenith to nadir, cutting the horizon at right angles, or those in which all the points have the same azimuth. The word is from the Arabic.

Azoic (Gr. *a*, 'without,' *zōē*, 'life'), a term applied in geology to rocks which contain no fossils. By those who deny the organic origin of Eozoön (q.v.), the archæan crystalline schists (which underlie the oldest fossiliferous strata) form the azoic system. See ARCHEAN SYSTEM.

Azores, or WESTERN ISLANDS, a Portuguese archipelago in the mid-Atlantic, between 36° 55' and 39° 55' N. lat., and between 25° 10' and 31° 16' W. long. Stretching over a distance of 400 miles, their nine islands are divided into three distinct groups—S. Maria and São Miguel in the S.E.; Terceira, São Jorge, Pico, Graciosa, and Fayal in the middle; and Flores and Corvo in the NW. Of

these, Flores lies 1176 miles W. of Cape Rocca in Portugal, 1484 SW. of Falmouth, and 1708 ESE. of Halifax. In 1431–53 the Azores were taken possession of by the Portuguese. They were at that time uninhabited; but that they had been visited by the Carthaginians is proved by Punic coins found on Corvo. They seem to have been known to the Arabian geographer Edrisi in the 12th century; and they are marked distinctly on a map of 1351. The Portuguese colonists called the whole group Azores, from *azor* or *azor*, a hawk; and they named two individual islands Corvo and São Jorge, from Corvi Marini and San Zorze, which, according to a map of 1375 had been previously seen in the western ocean. In 1466 Alfonso V. made a life-grant of the island of Fayal to his aunt, the Duchess of Burgundy, and from this circumstance many settlers migrated thither from Flanders. For the fight of the *Revenge*, the Azores' best memory for Englishmen, see GRENVILLE (SIR RICHARD).

The total area of the group is 919 sq. m., and the pop. (1881) 269,401. The area, population, and the maximum altitude of the different islands are as follows: S. Maria (38 sq. m.; 5880; 1889 feet); São Miguel (299 sq. m.; 107,000; 3854 feet); Terceira (164 sq. m.; 45,391; 3435 feet); Graciosa (24 sq. m.; 8718); São Jorge (91 sq. m.; 18,000); Pico (173 sq. m.; 27,904; 7613 feet); Fayal (69 sq. m.; 26,264); Flores (54 sq. m.; 10,700; 3087 feet); Corvo (7 sq. m.; 1000). The capital is Angra, in Terceira; but Ponta Delgada, in São Miguel, is a larger town. The Azores are of volcanic origin, and with the exception of Corvo, Flores, and Graciosa, are still liable to eruptions and violent earthquakes, the worst of twenty-one shocks since 1444 having been those of 1591, 1638, 1719, and 1841. Hot mineral springs are numerous; and the baths of Furnas, in São Miguel, are much resorted to by invalids. The coast is generally steep and rugged; the interior abounds in ravines and mountains. As may be presumed from the density of the population, the soil is fertile, and the climate healthy. The islands are also admirably watered. From 80 to 90 per cent. of both fauna and flora are decidedly European; and only of the land molluscs are 60 per cent. indigenous. Oranges are the chief article of export, besides wine, brandy, grain, pulse, pork, beef, cheese, and coarse linens; the imports include woollens, cottons, hardware, iron, glass, cordage, pitch, tar, staves, timber, oil, fish, rum, coffee, sugar, salt, and tea. Perhaps the greatest want of the group is a good harbour. The Azores are regarded as a province, not a colony, of Portugal, and as belonging to Europe. See Godman's *Natural History of the Azores* (1870), and W. F. Walker's *Azores* (1886).

Azo'te (Gr. *a*, 'without,' and *zōē*, 'life') is the name given by French chemists to Nitrogen (q.v.).

Azotised Bodies are those substances which contain azote or nitrogen as one of their constituents, and which form part of the living structure of a plant or animal, or are produced during its natural decay. The principal members of the group are *albumen*, present in white of eggs and the juices of plants and animals; *globulin*, or *crystallin*, a variety of albumen found in the lens of the eye; *vitellin*, another variety of albumen, composing the greater bulk of the yolk of the egg; *peralbumen*, a third variety of albumen found in the animal system during certain diseases; *fibrin*, which occurs largely in the seeds of cereals and in animal muscle; *casein* (or cheese matter), present in all milk; *legumin*, a variety of casein found in pease, beans, and leguminous seeds in general; *gelatin*, which is present in the skin, bones, and

other parts of animals; *chondrin*, a variety of gelatin obtainable from the cornea of the eye and the permanent cartilages; *isinglass*, another variety of gelatin manufactured from the inner membrane of the floating bladder of sturgeons and other fishes; *glue* and *size*, which are secondary forms of gelatin; *urea*, *uric acid*, and *hippuric acid*, which are present in the urine of the higher animals; *kreatin* and *kreatinin*, occurring in the juice of flesh; several forms of *urinary calculi*, which are found as stones in the bladder; and the very large and important class of *alkaloids*, including strychnine, morphine, quinine, &c. The principal members of the series of *azotised* bodies will be considered under their special headings; and the use of several of them as articles of diet will be noticed under FOOD.

Azo'us. See ASHDOD.

Azov, a town in the south of Russia, on the left bank of the Don, 7 miles from its mouth. The sand and mud deposited by the river have choked up the port, so that its trade and shipping have dwindled away, and the inhabitants depend mostly on fish-curing. Pop. (1881) 18,738. Azov was built 9 miles from the site of the ancient Greek colony of *Tauris*; and, when in the 13th century it was taken possession of by the Genoese, they altered its name to *Tana*. They were driven out of it by Timur (Tamerlane) in 1392. In 1471 it was taken by the Turks, and in 1696 by Peter the Great; and to Russia it was finally ceded in 1774.

Azov, SEA OF, named after the town, is a large gulf of the Black Sea, formed by the Crimean peninsula, or rather an inland lake connected with the Black Sea by the Strait of Yenikale or Kertch (anc. *Bosporus Cimmerius*), 28 miles long, and barely 4 wide at the narrowest. The intricate Siwash or Putri Sea, which is just a succession of swamps, is cut off from the western portion of the Sea of Azov by the long narrow slip of low sandy land called the Peninsula of Arabat. The ancient name of the Sea of Azov was *Palus Maotis* or 'Maotic Marsh,' from the Maotie dwelling on its shores; by the Turks it is called *Balik-Denizis*, or 'Fish Sea,' from its abundance of fish. The water is almost fresh. The whole sea is shallow, from 2 to 52 feet deep; and measuring 235 by 110 miles, it occupies an area of 14,500 sq. m. The largest river emptying into it is the Don. During the Crimean war, an expedition, having on board 16,500 English, French, and Turks, was sent to this sea in May 1855, which bombarded the ports, and cut off supplies intended for Sebastopol.

Azepitia, a town in the Spanish province of Guipuzcoa, situated in a fine valley on the Urola, 18 miles SW. of San Sebastian. A mile from it is the famous convent of Loyola, now converted into a museum, built somewhat in the form of an eagle with outspreading wings by the Roman architect, Fontana, in 1683. It comprises a tower of the Santa Casa, in which St Ignatius of Loyola, the

great founder of the Jesuits, was born in 1491. Here every year in July a great festival is held in his honour, to which pilgrims flock from all quarters. Pop. 6386.

Azrael forms in Moslem Mythology, together with Gabriel, Michael, and Israfil, the group of four highest angelic beings who surround the throne of God. Called the 'Angel of Death,' it is he who 'separates men's souls and bodies,' and with his assistants either 'tears them asunder with violence, or draws them apart with gentleness.' He is sent by Allah, and executes his commissions, having been promoted to his high office for his faithfulness and fearlessness. No idea of degradation is attached to him in the Moslem mind—he seems rather to have been identified with Fate, without any special malignant quality inherent in his nature. The Jewish rabbins have added to this awful figure the attributes of an evil genius, and 'the king of terrors,' the last enemy of man, in their conceptions has become almost the supreme embodiment of evil.

Aztecs, the name of the dominant tribe in Mexico at the time of the arrival of the Spaniards. See MEXICO.

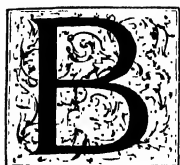
Azzùni, DOMENICO ALBERTO, a distinguished jurist, born at Sassari, in Sardinia, in 1749. He became judge of the Tribunal of Commerce at Nice; and in 1795 published a work in which he endeavoured to reduce maritime laws to fixed principles, and which appeared in French in 1805 under the title of *Droit Maritime de l'Europe*. Napoleon appointed him one of the commissioners for compiling the new commercial code. In 1807 he was appointed president of the Court of Appeal at Genoa. He published other minor works on maritime law, and a book on Sardinia. Ultimately he received a post at Cagliari, where he died 23d January 1827.

Azure, a French word technically used in Heraldry to signify blue. In engraving arms, it is always represented by horizontal lines.

Azurine (*Leuciscus ceruleus*), or BLUE ROACH, a fish of the same genus with the roach, chub, dace, minnow, &c., and most nearly resembling the Red-eye (q.v.) or Rudd (*L. erythrophthalmus*), from which it is distinguished by the slate-blue colour of the back, and the whiteness of the abdomen and fins. It is a fresh-water fish. It is very probably only a variety of the latter, very rare in Britain, but not uncommon on the Continent—e.g. in some of the Swiss lakes.

Azurite, a name which has been given to the mineral more commonly called lazulite (q.v.), and to which, along with Lapis Lazuli (q.v.) or *Azure-stone*, mineral turquoise (see TURQUOISE), &c., the generic name, *Azure Spar*, is sometimes given.—The name azurite is also given by mineralogists to an ore of copper, generally known as *Blue Copper* or *Chossyite* (see COPPER), nearly allied to Malachite (q.v.), and remarkable for its beautiful azure colour.

B



is the second letter of our own alphabet, and a corresponding and related symbol occupies the same place in the Greek, Hebrew, Arabic, and other alphabets. Derived ultimately from the hieroglyphic picture of a crane, it was called, when taken over by the Phœnicians,

beth, 'the house,' whence came the Greek name *beta*, which we retain in the last syllable of the word *alpha-bet*. In the Aramean alphabets the loop of the Phœnician form gradually opened out, and finally disappeared, giving the square Hebrew and the Arabic forms shown in the table on p. 187, article ALPHABET. In the Greek alphabet the tail was bent round, forming a second complete loop, as in our capital B, out of which the Greek minuscule *β* easily arose as a cursive form. Our minuscule *b* comes from the cursive Latin, this form being found as early as the 1st century A.D. scribbled on Pompeian walls. From the Roman cursive it was adopted into the Irish semi uncial, whence it passed in the 7th century into England, and in the 9th century into the French or Caroline minuscule, thus becoming the source of the Roman *b* of our printed books. It arose through the upper loop of B being left incomplete, as is shown by the intermediate form, *B̄*. In our *b* the loop of the primitive letter has disappeared, while in the Indian form this loop is all that remains. In the alphabet of ancient Corinth we find a form, S, which approaches very closely to that of the Egyptian Hieratic prototype. Phonetically, B may be defined as the soft labial mute.

Owing to physiological causes, *b* may exchange with *m*, *p*, *v*, or *f*. Thus the Greek *βίος* corresponds to the Latin *mortalis*, and the Gaelic *beinn* is the Cymric *pen*. Again, *episcopus* has become *bishop* in English and *évêque* in French, while the English *beaver* corresponds to the Latin *ferus*. About the 4th century, *b* in Latin and Greek was very commonly softened down to *v*, which explains how the French *avoir* arose out of *habere*, and the Italian *tavola* out of *tabula*. The physiological causes of these changes will be explained in the article LETTERS.

B, in Music, is the seventh degree of the diatonic scale of C. According to the tempered system of tuning, the ratio of B to the fundamental note C is $\frac{7}{5}$. In the German notation, B is called H, while B flat is called simply B. See MUSIC.

Baader, FRANZ XAYER VON, a distinguished German philosopher and theologian, born at Munich, March 27, 1765. After taking his degree in medicine, he decided to become a mining engineer, and in the course of his studies resided for four years in England. Here he became acquainted with both the mysticism of Boehme and the rationalism of Hume, the latter of which jarred terribly on his deep sense of the reality of religious truths. Indeed, he regarded all modern philosophy as atheistic in its tendencies, and the ethical autonomy of Kant, that man is in himself a rule of

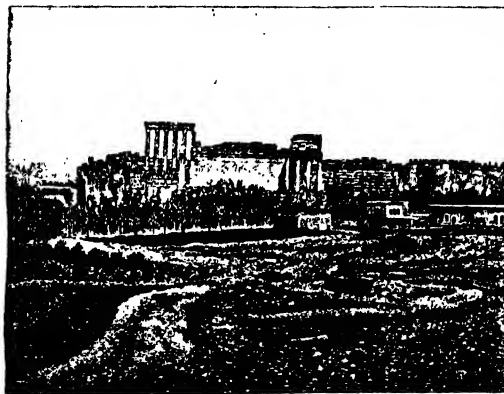
action, was particularly offensive to him. Baader's philosophical and professional researches were prosecuted simultaneously; and having risen to the post of superintendent general of mines, he retired in 1820, having been ennobled. In 1826 he was appointed professor of Philosophy and Speculative Theology in the new university of Munich; and here he died, May 23, 1841. Baader's philosophy draws its inspiration from the writings of Jacob Boehme (q.v.), and is essentially a theosophy, of which the notion of God is the fundamental idea, the divine nature its first problem. His system is based largely on the necessary attributes of God, and displays a devout, religious mind. He holds that the true ethical end is not obedience to a moral law, but a realisation of the divine life; and that as man, alienated from God, has lost the power to attain this, therefore no ethical theory which disregards the facts of sin and redemption can be satisfactory. In developing his system he falls into mystical symbolism, and this, along with his obscure aphorisms, renders his writings, which are not systematic, at times very difficult to understand. He is certainly, however, the greatest speculative theologian of modern Catholicism, and in Germany his influence has extended widely beyond his own church. His complete works have been edited by Hoffmann, and others of his followers (16 vols. Leip. 1850-60). See Pfeiderer's *Philosophy of Religion* (vol. ii. Eng. trans. 1887).

Ba'al, the principal male deity of the Phœnician and Canaanitish nations, as Ashtoreth was the principal female deity. The Bel of Babylon and Assyria has no identity with the Phœnician Baal beyond the fact that they both bore the title of Bel-Ba'al, 'lord.' Originally Baal was regarded as a personification of the sun, the ruler and vivifier of nature; but later his sovereignty in the moral world also was conceived. The oldest form of his cultus was a nature-worship on the tops of mountains; thus the Midianites and Amalekites worshipped him on Horeb and Sinai, the Moabites on Mount Peor, the Phœnicians particularly on Carmel, the Canaanites of the interior on Hermon. There were no representations of Baal, but his presence was symbolised by upright conical stones, which in earlier times were erected in the open air, but later in temples, and are supposed to have had a phallic significance. In contrast to Baal, the genial and fructifying power of nature, stood Moloch, the god of the sun in his destructive side, and the personification of the sterner side of nature. Later, both conceptions were united together in the person of Melkart, the supreme god of the Phœnicians. Melkart is usually supposed to mean 'king of the city,' i.e. Tyre; others consider it a contraction of two words signifying 'king of the earth,' while the learned Selden explained it as equivalent to 'strong king.' The Greeks confounded Baal or Melkart with their own Hercules; and for the purpose of distinction, termed him the Tyrian Hercules. From the earliest foundation of Tyre, he seems to have been the tutelary god of that city, and his worship apparently extended thence until it was prevalent in all the towns of the Phœnician

confederation, and was established in their remotest colonies, such as Malta, Carthage, and Cadiz. The worship of Baal, with its genial and festive character, had a powerful fascination for the early Israelites before the idea of a pure monotheism had been fully grasped by the popular imagination. Their defection to the worship of Baal-Peor as early as the close of the journey across the desert is related in the Book of Numbers. And after their settlement in Canaan, they returned to it again and again, placing Baal beside Jehovah, and dividing their worship of their own national God with the indigenous god of the country. The influence of King Ahab and his Syrian wife Jezebel spread it over the northern kingdom, spite of the opposition of the lofty-minded Elijah, but the revolution effected by Jehu finally banished it from Israel.

The word Baal enters into the composition of many Hebrew, Chaldee, Phœnician, and Carthaginian personal and place-names, such as Jezebel, Hasdrubal, Hannibal, Ethbaal, Baalbek. The word is also frequently found in conjunction with some epithet, and in such cases appears to have denoted a different deity, though it is not impossible that it may have been the same person regarded in another aspect, and as exercising merely a different function. Thus, we have Baal-Berith ('the Covenant Lord'), who was specially worshipped by the people of Shechem; Baal-Peor, the *Priapus* of the Moabites and Midianites; and Beelzebub, or Baalzebub ('the Fly god'), the idol of the Philistines at Ekron, where he had temple. The Celtic deity Beal was often confounded with Baal by the earlier mythologists.

Baalbek, a ruined city of Syria, 35 miles NNW. of Damascus, and 38 SSE. of Tripoli. The name signifies 'City of Baal,' the Sun-god, and was by the Greeks, during the Seleucide dynasty, converted into Heliopolis. Baalbek lies 4500 feet above sea-level, at the opening of a small valley into the plain of El-Bukâ'a (Coele-Syria), on the lowest slope of Anti-Lebanon, a well watered and delightful locality. It was once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments; now it is famous only for the splendour of its ruins, of which three deserve special notice. The most imposing is that of the Great Temple, which



Ruins of the Great Temple at Baalbek, with the Lebanon Range. (From a Photograph by Frith.)

was a rectangular building, 290 feet by 162, having its roof supported by a peristyle of 54 Corinthian columns, 19 at each side, and 10 at each end. Of these, six are yet standing. The circumference of these columns is 22 feet, and the

length of the shaft 55½; with pedestal, capital, and entablature, they measure 88 feet in height. The approach to this temple was through a portico (40 × 248 feet), a hexagonal hall (193 × 255 feet), and a grand quadrangle (411 × 440 feet). Except the columns mentioned, little of the great temple, or of the buildings in front of it, is left standing, but the ground is covered with their ruins. The vast size of the stones used in the Cyclopean substruction or platform (1052 × 318 feet) is remarkable, three of them being more than 60 feet long and about 13 feet square. South of the great temple is a smaller one, known as the Temple of Jupiter. It is similar in form, having its peristyle and the walls of its cella still mostly standing. Its dimensions are 228 feet in length by 124 feet in breadth, being thus larger than the Parthenon at Athens. Both temples, as well as the surrounding structures, are built of limestone, in a richly decorated somewhat fantastic Corinthian style. Besides these, there stands in the village of Baalbek, at the distance of 300 yards from the others, a circular building, supported on 6 granite columns in mixed Ionic and Corinthian style. Down to the 18th century it was used as a Greek church.

The early history of Baalbek is involved in darkness; but it is certain that, from the most distant times, it had been a chief seat of sun-worship, as its name implies. Julius Cæsar made it a Roman colony, and under Augustus it was occupied by a Roman garrison. Baalbek had an oracle held in such high esteem that in the 2d century A.D. it was consulted by the Emperor Trajan prior to his entrance on the second Parthian campaign. Antoninus Pius (138-161 A.D.) built the Great Temple, which the natives nowadays ascribe to Solomon. This temple is said to have contained a golden statue of the sun-god, which on certain annual festivals the chief citizens of Heliopolis bore about on their shoulders. When Christianity had become the dominant religion, the temple was converted by the Emperor Theodosius the Great into a Christian church. In the wars that followed the taking of the city by the Arabs, who sacked it in 748 A.D., the temple was turned into a fortress, the works of which are yet visible. The city was completely pillaged by Timur Beg in 1400. Both city and temple continued to fall more and more into decay under the misery and misrule to which Syria has been subject ever since. Many of the magnificent pillars were overturned by the pashas of Damascus merely for the sake of the iron with which the stones were bound together. What the Arabs, Tartars, and Turks had spared, was destroyed by a terrible earthquake in 1759. Baalbek is now a wretched village with a population of some few hundreds. See R. Wood and Dawkins's *Ruins of Baalbec* (1757); Cassas, *Voyage Pittoresque de la Syrie* (1799); two articles by J. C. M. Bellew in *Temple Bar* (1861); and Renan's *Mission de Phénicie* (1864).

Baba ('the old'), in Slavonic Mythology, originally a thunder-witch (the devil's grandmother), was represented like Dame Holle as a little, ugly old woman, with a monstrous nose, long teeth, and dishevelled hair, flying through the sky in an iron mortar. By the Czechs she is called now the iron, now the golden Baba.

Baba, a Turkish word signifying 'father,' originating, like our word *papa*, in the first efforts of children to speak. In Persia and Turkey it is prefixed as a title of honour to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons, as Ali-Baba.

Baba, CAPE, a bold rocky headland near the western point of Anatolia—the *Lectum* of the Greeks—about 12 miles from the northern extremity of Mitylene, the ancient Lesbos. On a shelving point of the cape stands the town of Baba, with a population of about 4000.

Babatag, or BABADAGH, a city with 7000 inhabitants, in a marshy district of the Roumanian Dobrudja, 2½ miles W. of Lake Razim. The importance of the place has declined since the Dobrudja ceased to be Turkish in 1878.

Babbage, CHARLES, born 26th December 1791, at Totnes, Devonshire, entered Trinity College, Cambridge, in 1811, but graduated from Peterhouse in 1814. Two years later he was elected an F.R.S., and from 1828 to 1838 he filled the sinecure of Lucasian professor of Mathematics at Cambridge. He united, in the most happy combination, powers of invention and observation with thorough scientific culture. Foremost among his eighty writings is his extremely correct and well-arranged *Table of Logarithms* (1827), he being the first to make the method of constructing such tables the object of earnest study. As early as 1812 the idea had occurred to him of a Calculating Machine (q.v.); and by 1822 he had constructed a small model of one. Commissioned by government to superintend the construction of a larger and improved machine, after four years' operations he devoted a twelvemonth to visiting a great many workshops and factories on the Continent, in order to become acquainted with all the resources of mechanical art, and thus be in a position to use them in his great undertaking. This survey afforded him the necessary information for his able work *On the Economy of Manufactures and Machinery* (1832) a book that in three years ran through four editions, and was translated into four languages. In it all mechanical processes are classified from the most scientific point of view, and the most interesting examples of the more important kinds of manufacture are described. Besides his *Comparative View of the Various Life Assurance Societies* (1826), *Ninth Bridgewater Treatise* (1837), *Decline of Science* (1831), *The Exposition of 1851* (1851), and the autobiographical *Passages from the Life of a Philosopher* (1864), Babbage contributed many very interesting papers to the Transactions of the Royal Societies of London and Edinburgh. His calculating machine, which cost £6000 of his own money, and £17,000 of the nation's, was abandoned by government in 1842, after eight years of circumlocution, and is now preserved in an unfinished state in the South Kensington Museum. In his later years he was chiefly known by his fierce hostility to organ-grinders, in spite of whom he lived till 18th October 1871.

Babel, TOWER OF. According to the story in Genesis xi., the descendants of Noah journeyed from the east till they came to the plain of Shinar (the Hebrew form of the native name Sumir—or Sungir, as it was pronounced in the allied dialect of Accad—the southern half of pre-Semitic Babylonia), and there they impiously began to build a tower of burned bricks and bitumen, whose top might reach unto heaven. But Jehovah confounded the language of the builders, so that they could not understand each other, and scattered them over the face of the earth, wherefore the tower was called *Babel*, or 'confusion,' from the Hebrew *balbel*, 'to confound.' This etymology, however, is an example of the paronomasia so frequent in the Hebrew text of the Old Testament; Babel is really the Assyrian *Bab-ili*, 'the gate of God,' which is merely a Semitic translation of the old Accadian (or rather Sumirian) name of the town Ca-dimira, where Ca

is 'gate,' and *dimira*, 'God.' There appears to be no reference to the story in Berosus, and no certain representation of it has been found on any of the Babylonian gems, but George Smith discovered some fragments of a cuneiform text affording a marvellously close parallel to the account in Genesis. According to this version, certain men under a leader, 'the thought of whose heart was evil,' and who had 'repudiated the father of all the gods,' began to build at Babylon a 'mound' or hill-like tower, but the winds blew down their work, and Ann 'confounded great and small on the mound,' as well as their 'speech,' and 'made strange their counsel.' It is Bel, 'the father of the gods,' whose anger is stirred up against the impious builders; but it is the god Ann who destroyed them, and is accordingly called 'king of the illustrious mound.' The builders of the Tower of Babel intended to scale the sky, like the giants and Titans of Greek mythology, whose assault on heaven and discomfiture by Zeus may be but an echo of the old Babylonian tale—conveyed to Greece by the Phœnicians. Chaldean tradition assigned the building of the tower and the subsequent confusion of languages to the time of the autumnal equinox, and it is possible that the mythical hero Etana of the Izdubar legends, who, according to an obscure fragment, builds a city in defiance of the gods, may have been the leader 'the thought of whose heart was evil.'

With reference to the site of the Tower of Babel, nothing more is certain than that it was somewhere in Babylon. It is usually supposed to be represented by the great pile of Birs Nimrud, which stood in Borsippa, the suburb of Babylon, 8 miles distant, and was dedicated to Nebo and called 'the Temple of the Seven Lights' or planets. Sir Henry Rawlinson discovered that it consisted of seven stages of brickwork on an earthen platform, each stage being of a different colour. Its north-west, south-east, north-east, and south-west sides are 643, 613, 420, and 376 feet long respectively, and its ruins still rise 153 feet above the level of the plain. It had long stood unfinished when Nebuchadnezzar undertook to restore and finish it. Schrader thinks that the long period during which it had remained an unfinished ruin caused the growth of the legend which saw in it a monument of the overthrow of human presumption, the diversity of languages spoken in the plain of Mesopotamia being sufficient to account for the localisation of the story of the confusion of tongues in that country. Another site proposed is at the ruins now called Amran, within the city of Babylon itself. The mound here is 1100 yards in length and 800 in breadth. See Sayce's edition of George Smith's *Chaldean Account of Genesis* (1880); vol. i. (1882) of Lenormant's *Les Origines de l'Histoire d'après la Bible*; and Sayce's *Fresh Light from the Ancient Monuments* (3d ed. 1886).

Bab-el-Mandeb (i.e. 'the gate of tears'), so called from the danger arising to small vessels from strong currents, is the name of the strait between Arabia and the continent of Africa, by which the Red Sea is connected with the Gulf of Aden and the Indian Ocean. The Arabian peninsula here throws out a cape, bearing the same name as the strait, rising to the height of 865 feet. About 20 miles distant from this cape stands the wall-like coast of Africa, rising in Ras es Sean to the height of over 400 feet. Within the straits, but nearer to Arabia, lies the bare rocky island of Perim (q.v.), since 1857 occupied by the British as a fort; its guns command the entrance to the Red Sea. The strait on the east side of this island is called the Little Strait, and that on the west the Great Strait.

Bab'ér (Zehir-Eddin Mohammed), the first of the Great Moguls in India, a descendant of Timur, was born in 1483. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in the sovereignty of the countries lying between Samarkand and the Indus. Driven more than once from his paternal dominions by the usurpation of his uncle and the revolts of his nobles, he made himself master, by prompt and daring movements, of the provinces of Kashgar, Kunduz, Kandahar, and Kabul. Having thus opened the way to India, he made two or three rapid incursions into Hindustan; and finally, about the end of 1525, taking advantage of the feeble government of Ibrahim Lodi, the Afghan emperor of Delhi, he crossed the Attock (the Kabul branch of the Indus), quickly defeated some bodies of troops that opposed him in the Punjab; and at last, in April 1526, on the plain of Panipat, not far from Delhi, encountered and fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1000 elephants of Sultan Ibrahim were dispersed; Ibrahim himself fled; and Baber made his entry into Delhi. In the following month, Agra, the second city of the empire, surrendered. Baber's enjoyment of empire in India was brief; he died in 1530, having had to contend during the five years of his reign with numerous conspiracies and revolts. To the talents of a general and statesman, which he manifested alike in his conquests, his improvements of public roads, measuring of lands, adjustment of taxation, and his postal arrangements, Baber united a taste for science and art. He wrote in the Tartar language the history of his own life and conquests, which was translated into Persian by Abdul Rachim, and from the Persian into English by Leyden and Erskine (1826). Baber was succeeded on the throne of Delhi by the eldest of his four sons, Humayun, and was the founder of the Baber or Great Mogul dynasty. See MOGUL.

Babouf, FRANÇOIS NOEL, a communist of the time of the French Revolution, was born in 1762 or 1764 at St Quentin, in the department of Aisne, France. He was land-surveyor at Roye in Picardy, and on the breaking out of the Revolution in 1789 he became an adherent of the most extreme revolutionary party. We hear of him for the first time in 1790, when he receives honourable mention from Marat in his paper, *The Friend of the People*. As one of the extreme left, he opposed Robespierre during the Reign of Terror. In 1793 Babouf had started a newspaper, and in 1794 he gave the name of *Tribune of the People*; and he began to sign himself 'Gracius Babouf.' In this paper he advocated the most violent measures; particularly a rigorous system of communism, by which private property should be abolished, and the fruits of the common industry placed in a common magazine, from which they should be distributed with the most scrupulous equality. A secret conspiracy was formed, the aim of which was the destruction of the Directory and the establishment of an extreme democratic and communist system. The plot was discovered, and Babouf and other chiefs were brought to trial. Babouf was condemned to death, and guillotined in 1797. He was an enthusiast, without talent or culture, but has a certain importance as a forerunner of the social revolutionary movement.

Babi, the name of a modern Persian sect, derived from the title, *Báb-ed-Dín* ('gate of the faith'), assumed by its founder, Mirza Ali Mohammed, a native of Shiraz, who in 1843, after a pilgrimage to Mecca, undertook to form a new religion from a mixture of Mohammedan, Christian, Jewish, and Parsee elements. His con-

troversies with the *mollahs* shortly led to his confinement to his own house, where he formulated his doctrines, privately instructed his disciples, and increased his pretensions. He now laid aside the title of Báb, assuming that of *Nokteh* ('point'), and claimed to be the focus to which all preceding dispensations converged. He sent out missionaries in various directions, the most famous of whom was a woman, Gurred-ul-Ain ('consolation of the eyes'), remarkable for beauty and intelligence, who preached against polygamy. The sect soon became numerous, and were not molested by the reigning shah; but on the accession of Nasir-ed-Din in 1848, apprehending persecution, they took up arms, proclaiming the advent of the Báb as universal sovereign. Several Persian armies were routed, but finally the insurgents were reduced by famine, and most of them executed (1849-50). The Báb had held aloof from the revolt, but he was arrested and put to death, after a long imprisonment, in 1850. His successor was recognised in the youthful son of the governor of Teheran, who retired to Bagdad, where he afterwards lived quietly. An attempt of three believers to assassinate the shah in 1852 led to a terrible persecution of the sect; numbers were tortured and burned, among them Gurred-ul-Ain. Bábism has nevertheless gained in strength, and is at present widely diffused in Persia; its members live in apparent conformity to orthodox Mohammedanism, but privately holding the Báb's doctrines, which are contained in an Arabic treatise, *Bayan* ('the exposition'), written by the founder himself. They form essentially a system of Pantheism, with Gnostic and Buddhist additions. All beings are emanations from the Deity, by whom they will ultimately be reabsorbed. Bábism enjoins few prayers, and those only on fixed occasions; encourages hospitality and charity; prohibits polygamy, concubinage, and divorce; discourages asceticism and mendicancy; and directs women to discard the veil, and share as equals in the intercourse of social life. See SUFISM, of which it is a healthier and more practical outcome. See also Gobineau's *Religions dans l'Asie Centrale* (Paris, 1865).

Babington, ANTHONY, was born of an old Catholic family at Dethick, Derbyshire, in 1561. Young, handsome, rich, left an orphan at ten years of age, he had served for a short time as page to Queen Mary of Scotland, then a prisoner at Sheffield, when in 1586, some seven years after his marriage, he was induced by Ballard and other Catholic emissaries to put himself at the head of a conspiracy that had for its object Elizabeth's murder and Mary's release. Babington reserved the deliverance of Mary for his own share, entered into correspondence with her, and received from her letters approving of the assassination. The plot was betrayed, and after hiding in the depths of St John's Wood and at Harrow, he was taken, and with thirteen others condemned to die. His prayers for mercy, his explanation of the cipher letters, were all in vain, and on 20th September 1586, he followed Ballard to the scaffold.

Babiroussa (*Sus babiroussa*), a species of hog, according to some a distinct genus, inhabiting marshy forests in Celebes and some of the smaller islands of the Eastern Archipelago. The canine teeth in the male are very large, the upper ones being curved towards the top of the head, and so like horns at first sight that the animal is often called the horned or deer hog. It is a nimbler animal than the common hog, and has much more slender legs. It swims well and frequently, is fond of eating maize, and is often killed for the sake of its flesh. It is of interest, however, mainly on

account of the extraordinary development of the canines in the male. The teeth, like those of rodents (see **TEETH**), grow from persistent pulps,



Fig. 1.—Babiroussa (*Sus babiroussa*).

and thus admit of that extension which doubtless occurred at first as an abnormal variation, but has now become a constant character in the males. In the wild boar (fig. 2), wart-hog, &c., the upper canines, even in the female in some instances, tend similarly to curve upwards. This variation, rendered possible by the persistent pulp, and by a slight mobility of the teeth in their sockets, seems largely due to some slight displacement preventing the upper

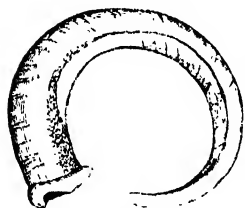


Fig. 2.—Tooth of Wild Boar, as the result of slight divergence, bringing the snout and teeth

against hard objects would readily account for an initial displacement. What occurs to a slight extent and occasionally in certain hogs, about failure of apposition, and thus permitting overgrowth, is present in the male babiroussa as a constant and exaggerated feature. The peculiarity is either transmitted by inheritance, or reappears in every male in response to the constant recurrence of the same conditions. In specimens kept in captivity, the variation has been known to become even more exaggerated. Mr Sutton discusses this interesting development in his *General Pathology* (1886), and notes a case from the Zoological Gardens in London where the upper canines of a babiroussa, which was fond of

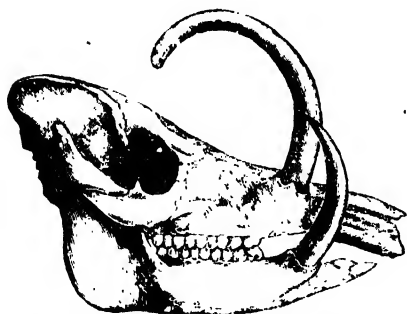


Fig. 3.—Skull of Babiroussa (from Sutton).

rubbing its tusks, exhibited a very marked circular development, and would have penetrated the skull had they not been repeatedly cut (fig. 3). Though it is unreasonable to expect to find a use for

every variation, it cannot be doubted that these exaggerated canines are of use to the males in fighting for the females, and are to some extent at least an outcome of the general characteristics of the sex. See **SEX**.

Baboo (Bengali and Hindustani *Babu*), properly a term of respect, like Master or Mr, in this sense now used only in Lower Bengal. Anglo-Indians often understand it as meaning a superficially cultivated Bengali; and it often means neither more nor less than 'a native clerk who writes English.' English so written, more copious than correct, and delighting in long and learned words often most ingeniously misapplied, is known as Baboo English. See Sir Henry Yule's *Hobson Jobson* (1886). See **BARA**.

Baboon, or **CYNOCEPHALUS** (i.e. 'dog-headed'), a genus of Old-World monkeys (*Catarrhini*), with numerous species such as mandrill, drill, sphinx, chaema, and hamadryas. They are at home in Africa, but spread into adjacent parts of Asia. Their most striking characters are—the plump form, the prominent snout, the large canine teeth, the capacious cheek-pouches, the ugly callous cushions on which they sit, and the frequent shortness of tail.

Animals so abundant, ferocious, and repulsively ugly as the baboons, could not escape the observation of the ancients. Aristotle was impressed by the pig-like muzzle of the mandrill, to which he gave the expressive name of *Charopithecus*, or hog ape, and even the comparative indifference of the next eighteen centuries to zoological facts was repeatedly interrupted by the hideous vision of some baboon. But long before Aristotle, the baboon had been an object of veneration in Egypt, and was especially sacred to, and typical of Thoth, the lord of letters. Egyptian monuments are thus frequently adorned with statues and figures of baboons, and their mummies are still occasionally found. They held a less honourable place in the middle ages as curious pets in any completely equipped fashionable establishment. Nor is it so long since the mandrill, Jerry of the Surrey Gardens, used to be brought to amuse George IV. Their interest for us now is on the one hand theoretical, and concerns such facts as the numerous characters in which these animals show affinity to the carnivores, and on the other hand practical, so far as these mischievous and voracious animals commit devastations on plantations and other property in the regions which they frequent.

Distribution.—Fossil remains seem to show that the baboons had once a much wider distribution than the now living species. They have, however, kept their footing well, being widely distributed throughout Africa. The drill and mandrill frequent the west coast (Guinea); the baboon proper inhabits wilder and more inland regions from Abyssinia and Kordofan onwards; the chaema and sphinx have rocky homes in the south and west respectively; the hamadryas has its seat among the coast mountains of Abyssinia, South Nubia, and Western Arabia; the geladas occur in the highlands of Abyssinia; and the black baboon is found in the island of Celebes.

Structure.—The dog-shaped head, with its long muzzle and almost constantly terminal nostrils; the capacious cheek-pouches, in which a superfluity of food can be temporarily stowed away, and the frequently large and brightly coloured callous cushions on their hips, are the most prominent external characters. Some of the more internal anatomical characters are no less striking. For while the double curve of the back, and some of the relations of the sacral bone which unites the haunches, and other characters, suggest features

perfected for instance in man, the baboons exhibit greater affinity with the carnivora. This is especially marked in the mandrill, where the backbone, the sacrum, the hip-bones, the paw, and other structures, exhibit a suggestive resemblance to those of the carnivores.

Habit.—The baboons are quadrupeds, running swiftly on all fours, climbing with great vigour, fond of sitting on their haunch-pads, and especially at home in mountainous districts. Many of them live in herds, and are therefore formidable both to animals and property. The troops are led by patriarchs, and guarded by sentinels. They fight with rival herds, and have to withstand the attacks of leopards and other carnivores. Playful and amiable when young, the older forms, and especially the males, are notorious for their evil dispositions, and allow their passions to run riot. The *facile princeps* in iniquity is the mandrill. Those brought home to zoological gardens become specially malicious, the result in part of their sensitiveness to cold, and of the irritations of visitors. They are all clever, dexterous animals, with well-developed brains. Their food varies greatly—fruits, roots, seeds, insects, worms, and many other commodities. The anubis baboon lives principally on the stem and roots of the unique welwitschia, so remarkable for its persistent cotyledons, which act as substitutes for the undeveloped foliage leaves.

Different Species.—About a dozen different forms are known. The Baboon proper (*Cynocephalus babuin*) is hardly known except in captivity. It is a large animal, with a yellowish-brown hide, long depressed skull, and uncoloured cheeks. It is equally strong and clever, and is often utilised by Arabian and Egyptian conjurers. A near relative is the Sphinx (*C. sphinx*), with only a stump of a tail. The Pig-tailed Baboon (*C. porcarius*) occurs in troops in South Africa. Its fur and medium-sized tail are almost black; the muzzle is very long; the colour of the naked parts of the skin is violet-blue; the ridges above the eyes are very prominent, and the eye sockets are curiously separated by an upright ridge of bone; the upper canine teeth are extraordinarily long. The Sacred Baboon (*C. hamadryas*), frequenting the Abyssinian highlands,



Sacred Baboon (*Cynocephalus hamadryas*).

stands about 4 feet high, is of a light-gray and dusky-brown colour, with a naked flesh-coloured face, and a much compressed ugly skull. Formerly sacred to Thoth, and typical of learning, the hamadryads have sunk in modern Egypt to a subordinate position as luxurious curiosities. They are sometimes caught by being intoxicated with liquor purposely exposed near their haunches, fondness for

stimulants being one of their often observed vices. Their bold plundering habits not infrequently lead them into collision with natives and travellers. The Anubis Baboon (*C. anubis*) is common in Angola on the west coast of Africa, where it lives in the dry gullies. A closely related or identical form inhabits the safe tops of rocks farther inland, and does much damage by descending for midnight ravages among the Indian corn plantations. The Gelada Baboon (*C. gelada*), which is somewhat aberrant, owing to the non-terminal position of the nostrils, frequents the hills of Abyssinia up to an elevation of 10,000 to 13,000 feet. For this form a special genus (*Theropithecus*) has been unnecessarily established. The Mandrill (*C. Marmor*), with its short tail-stump, its enormous, brightly coloured cheek swellings, its brushed



The Mandrill (*Cynocephalus Marmor*).

crown of hair, pig-like snout, 'beetled' brows, sunken eyes, immense canines, and decorated posteriors, is well known as the ugliest and most brutal of the monkeys. Its ugliness is in part, however, a secondary sexual character, the colours, &c. being more marked in the males, and apparently attractive to the less brightly coloured females. It has been already noted how carnivore-like many of its structures are. The mandrill, 'Happy Jerry,' of the Surrey Zoological Gardens, was the subject of many observations as to the habits and disposition of these repulsive forms. The Drill (*C. leucophaeus*) is a smaller form, with less striking colouring and ugliness; it frequents rocks and plains on the Guinea coast. The Black Baboon (*C. niger*) is found far from Africa in the island of Ceylon, and has been introduced into other islands. It stands about 2 feet high, has long black fur, an upright curl on the crown of its head, and a rudimentary tail. It frequents woods, and its separation from the other species points to some earlier connection of the continents. An able and graphic account of baboons is given by Professor Martin Duncan in Cassell's *Natural History*, vol. i. See MONKEYS.

Babrius, a Greek fabulist, who lived most probably shortly before the age of Augustus, but of whom nothing whatever is known, his very date being put variously from the Alexandrian age to the middle of the third century of our era. He made a considerable collection of Æsopic fables (see ÆSOP), which he turned into choliambic verse, in a natural and popular style. Several prose versions and transformations of these were made during the middle ages, and have come down to us under the name of *Æsop's Fables*. Bentley was the first to recognise in these so-called prose fables of Æsop

traces of versification showing the original work of Babrius. A few fables were added from manuscripts by Furia, Kornis, and Schneider, and all that was known at the time was collected by Knoche (Halle, 1835). At last, in 1842, a Greek of the name of Minoides Minas, employed by the French government to explore the convents of the East, discovered at Mount Athos a manuscript with 123 hitherto unknown fables of Babrius, a copy of which he made and brought to Paris, where they were published in 1844. In 1857 he found 95 fables more, the authenticity of which, however, was denied by Conington, Cobet, and other scholars. These were edited by Lewis in 1859, were included by Bergk in his *Anthologia Lyrica* (4th ed. 1883), and were edited, with additions from manuscripts in the Bodleian and Vatican libraries, by Gildhuus (Vienna, 1882). See Lachmann's edition (Berl. 1845), and Rutherford's *Babrius* (1883).

Baby. For the feeding of infants, baby-farming, &c., see INFANT.

Babylon was the name of a fortress in Lower Egypt, on the right bank of the Nile, opposite the pyramids of Ghizeh. Its origin was ascribed to Babylonian deserters, but it first became an important place under the Romans.

Babylonia (*Babitu* in the Assyrian inscriptions, *Babirush* in the Persian) was the name given to the low alluvial plain watered by the lower streams of the Tigris and Euphrates, now forming the modern Arab province of Irak-Arabi. In the Old Testament it bears the various names of Shinar, Babel, and 'the land of the Chaldees.' It is difficult to state the true boundaries of this rich and fertile land, for during the various periods of Babylonian and Assyrian supremacy they varied considerably. The northern boundary, from the region of Nahrain or Mesopotamia, was formed partly by the Euphrates and its tributaries, but chiefly by a line of forts and frontier stations established by mutual arrangement between the Assyrian and Babylonian kings at various periods, this being probably the Median Wall of the classical writers. On the east the Tigris formed the natural boundary, but some portions east of that river and south of the Lower Zab at times were included in the Chaldean empire. These were the provinces of Namri or Kurdistan. The western boundary was the Euphrates, or rather the desert to the east of that stream, for from the earliest period the fertile fringe of land along the river's bank in the neighbourhood of Ur (Mugheir) and Borsippa (Birs Nimrud) was under Babylonian rule. The southern limit was the shores of the Persian Gulf, the waters of which then extended considerably farther inland, the two rivers as late as the time of Sennacherib, 705 B.C., entering the sea by separate mouths. The country has from all time been one of the most fertile spots in the whole of Western Asia, and famed for its rich corn-producing qualities. Indeed Herodotus says that it supplied one-third of the corn produced by the whole Persian empire. The inscriptions afford ample confirmation of this fact, the title receipts of the temples showing an enormous yield of cereals. This natural fertility was greatly aided by the splendid system of artificial irrigation by a network of canals spread all over the country, many of which are navigable to the present day. The most important of these was the Nar Malka, which was serviceable as late as the 7th century A.D., and only disused when allowed to fall into decay after the Mohammedan conquest. This important artery joined the Tigris and Euphrates in North Babylonia, passing through the ancient cities of Sippara or Sepharvaim and Akkad, and entering the Tigris about 30 miles below Bagdad.

The lines of its course are marked by the modern Yusifich and Amran canals. This canal was probably excavated by Khaymuragas in the 22d century B.C. Other important inland waterways were the Nar Kuti or river of Kutlia, the modern Habi-es-Sook, which passed through almost the whole length of Central Babylonia—and the Nar Essu or new river, a large canal in the neighbourhood of Babylon excavated by order of Nebuchadnezzar II. (605 B.C.). According to the ancient records, Babylonia was divided into several provinces, the number and extent varying considerably at different periods in the history of the empire. The chief division appears to have been first into two large provinces of Sumir or Shinar (South Babylonia), the region from the Persian Gulf to Babylon, probably at one time, as some critics think, the name of all the lower valley of Mesopotamia, and Akkad or North Babylonia, extending from the boundary of Sumir to the Assyrian and Mesopotamian frontier. The capital of this latter province was, like Babylon, built on both banks of the Euphrates, the larger half being called Sippara of Samas, the sun god (the modern *Abu Habbe*), and the smaller half Akkad or Agade. The latter was afterwards named 'Sippara of the moon-goddess,' whence the scriptural name Sepharvaim, 'the two Sipparas.' Other minor provinces embraced within these two were Gan-Dumiyas (the northern part of the Akkad) and the south part of Akkad, Edina or Eden, called also Zeru or Dura, the plain in the immediate vicinity of Babylon; Gambin, the marsh region, now the modern Afadj; and Mat Kaddu, the land of the Chaldeans, the region bordering on the Persian Gulf and the east bank of the Euphrates.

The natural products of this fertile land were almost unbounded—corn and many other cereals, and also grapes, fruits of several kinds, sesame, vegetables of several kinds, cucumbers, melons, onions, garlic. Stone being extremely rare, having to be obtained from Upper Mesopotamia or the mountains of Elam, the only building material was clay, an ample supply of which was obtainable.

Ethnology. Babylonia, according to both sacred and classical writers, has always been a land of mixed races and tongues, and the polyglot and heterogeneous character shown by the monuments to have existed in a very remote antiquity. The earliest of the inscriptions has revealed to us the important fact that the first population was a people belonging to the Ugro-Finnic branch of the Turanian family. The linguistic connection has been confirmed by the recent discovery by M. De Sarze of statues of these primitive inhabitants which present an undoubted Tartar type of features. The skull is dolicocephalic, with high cheek-bones, early black hair, the eyes oblique and bright; the type being ethnically related to the Elamites of Susiana and the Turanian Proto-Medes, to whom we find this early race linguistically related. These people, the Sumero-Akkadians, were not aboriginal to the plains of Chaldea, but came, as their traditions indicate, from the mountains to the north-east—whence the name of one branch of the family, the Akkadai or 'mountaineers'—and brought with them the already fairly advanced elements of civilisation which they planted in Chaldea. At a very early period in the history of Babylonia the Semites appear as an element in the population, their type being clearly indicated in the sculptures connecting them with the Hebrew and Northern Arabs, while the same relationship is linguistically established. From time to time, by war or commerce, other elements were introduced into the population, until almost every nation finds its representative in the 'mixed crowd of nations' inhabiting the plains of Chaldea.

The Semites having once obtained a footing in Babylonia, soon assimilated themselves to the more advanced culture of their Sumero-Akkadian masters. They borrowed the cuneiform mode of writing, the religion, mythology, and much of the science of that inventive people, and so rapidly increased in numbers and power, that as early as about 3800 B.C. we find a dynasty of Semitic kings under Sargon of Akkad and his son Naram-Sin, ruling in North Babylonia.

Chronology.—Hitherto students of Babylonia have been almost entirely dependent upon the fragmentary portions of the Canon of Kings drawn up by the Greco-Chaldean priest Berosus about 268 B.C.; but these lists are now confirmed and superseded by Babylonian Canon inscriptions dating from the 6th century before our era. The documents are (1) a Canon of Kings by their dynasties, extending from 2200 B.C. until 647 B.C., partly mutilated, but capable of restoration; (2) Tablet of Synchronisms History of Assyria and Babylonia, which gives the names of the Babylonian kings from about 1800 B.C. to 732 B.C.; (3) a Chronicle Tablet giving the chief events in Babylonia, the month and day being given in most cases, from 747 B.C. to 660 B.C.; (4) A collection of dated contract tablets extending from 680 B.C. to 150 B.C. This unequalled series of chronological documents gives an almost complete sequence to Babylonian history, and although there are still *lacunae*, the basis is now much more sure than when we were dependent solely upon the second-hand statements of Ctesias and Berosus.

Domestic and Social Life.—The few notices in the works of Herodotus and Ctesias and other ancient writers, afford us but a very scanty notion of the highly developed character of the social life of ancient Babylon. The recovery from the libraries and treasuries of the oldest cities of the empire of many thousands of inscribed tablets relating to almost every phase of private daily life, afford us an insight into the sociology of this ancient empire, far more clear than that provided by the records of any other primitive kingdom, excepting perhaps the sister-kingdom of Egypt. The child, immediately after birth, was sealed with the sign of sonship, which was confirmed by witnesses; circumcision followed at the period of eight or ten days. On reaching the age of puberty, the youth was admitted to his portion as a free-born citizen, and his freedom attested to him. The Babylonian legal tablets relating to the laws of marriage certainly do not confirm the statements of Herodotus. The dowry of the woman was secured to her, and was returnable in case of divorce, while marriage was attended by both a religious and civil ceremony. Women, especially married women, occupied an exceptionally favourable position in Babylonia. Offences against the mother were punishable by mutilation and deprivation of civic rights. Women could trade and own slaves and other property in their own right. All free Chaldeans had to be educated and taught tablet-writing. Slaves were protected from cruel treatment, and if injured, had to be supported by their masters. The could own land, and, if able, maintain themselves. Slaves were often apprenticed to learn trade by their masters.

The laws were administered by regular appointed judges, who sat either in the gates of the temple or in the great gate of the city. The supreme judges were called 'the judges of the king.' The decisions were all governed by certain precedents, many of great antiquity, which were drawn up and carefully preserved. The chief punishments were fines, imprisonment, deprivation of civic rights, and in some cases death. The right of appeal to the king could be claimed. The revenues were derived from

a fixed tariff of taxes. The chief taxes were the 'king's tax,' apparently a tithe on all property, the army tax, and the dues levied on certain districts for ships. The local taxes were the temple tithes, called tenths (*esritum*), the first-fruit tax, the corn and date and sheep tax, and the road and canal dues. Numerous documents relating to these dues are now in the British Museum collection. The temples had rich estates attached to them, like the modern Arab Wakif lands, and farmed them or leased them at will. The transfer of land was regulated by fixed laws, and leases had in many cases carefully drawn plans of the estates attached to them. The standard currency was a silver one, the units being the talent, maneh, shekel, and paras. Coined money was introduced in the reign of Darius. The first coins, stamped with the figure of a bird, were perhaps the *tetradrachma* of Athens.

Art and Manufactures.—Babylonian art was until recently represented by a few engraved cylinders and gems; but the recent explorations on the Shat-el-Hie, the site of the ancient city of Sergal or Kullum, conducted by Mr Rassam at Sippara (*Aba Habbar*), and by M. De Sarzec at Tel-lo, have discovered statues which are really good works of



Fig. 1.—Chaldean Cylinder, Marble or Porphyry (New York Museum).

art, differing from all previous examples of Babylonian art, and from the later works of the Assyrian artists. The largest of these statues is nearly life-size, and represents the 'high-priest' Gudea, the viceroy of the city, seated on his throne; the statue is extremely accurate in its anatomy, and carved in the hardest green diorite. The whole of the group is covered with a long inscription in archaic characters, recording the restoration of the temple by this prince in (about) 2700 B.C. Still more remarkable is a fine head carved in red porphyry, which clearly bears the appearance of being a portrait, and is true to the facial characteristics of the Sumero-Akkadian race. These statues bear a close resemblance to the remarkable statues of the early Egyptian king Kephren. The execution of these works of art indicates that the art of sculpture had been long practised, and that tools of the most perfect temper must have been used. Along with these were found several bronze statuettes, showing a knowledge of the art of casting metals. Gem-engraving has always been a special feature of Babylonian art, and numerous hard stone seals have been found, the intaglio workmanship of which shows a high development of the lapidary's art. The subjects upon these are chiefly taken from the legends of Gilgamesh, or from the popular myths, while others relate to the future life. Talismanic gems bearing emblems of the gods and magical formulae are also frequently found. The stones chiefly selected by the Babylonian lapidaries are hematite, green and red jasper, cornelian, chalcedony, crystal, lapis-lazuli, onyx, and sardonyx. Music formed an important feature both in the court and religious ceremonies of the Babylonians at a very early

period, and on the sculptures we find the harp, pipe, and cymel represented. Among the trades mentioned in the tablets we find the weaver, dyer, potter, smith, tanner, and carpenter.

History.—The discoveries of the last few years have given to the history of the ancient Babylonian empire a most surprising retrospective enlargement. It is now evident, from the monuments and inscriptions which have been obtained from the traditionally oldest cities of Chaldea, that the civilisation of the ancient people of Babylonia has an antiquity rivaling that of ancient Egypt. The earliest monument of which we can accurately fix the date is a stone whorl in the British Museum, brought from Sepharvaim by Mr Rassam. It is an oval-shaped stone, inscribed in what is called *line* writing—that is, writing in which the characters are formed more by lines than by the ordinary wedges, a style that goes back to a time when the hieroglyphic or pictorial system of writing was beginning to be discontinued. The king's name inscribed is that of Sargon I., king of

Akkad, who is now universally assigned to the remote antiquity of 3800 B.C., and other inscriptions of this remote period are to be found in other European museums. Older still, in all probability, are the very archaic records found by M. De Sarzec at Tello, in the neighbourhood of Erech, which, written in the ancient agglutinative dialect of the Sumerio-Akkadian inhabitants, must precede the Semitic inscriptions of the northern kingdom of Sargon and his successors. These early inscriptions are mostly of a very short character, containing little more than the names and titles of the kings who ruled the cities, but at the same time they afford us information as to the state of civilisation existing in Chaldea nearly 4000 years before the Christian era. The empire had not become one consolidated whole, and polyarchy was the most prevalent form of government, each city being ruled by its local king. Thus, Sargon was king of Akkad, and especially styles himself king of 'the city.' Ur-badu and Dungi were rulers of Ur, and others held sway in the cities of Eridhu, Larsa, and Babylon. Some of these early rulers claim the titles of king of Sumir (Shinar) and Akkad, a division which in after time had the geographical significance of N. and S. Babylonia, but which in the earlier ages are certainly rather to be regarded as ethnic than local divisions of this early population. Babylonia, though always one of the most important cities of the empire, was not the earliest capital, for the cradle of Chaldean civilisation was in the region of the south. Here all the ancient legends connected with Gilgamesh as Nimrod are located, and find their centre in the city of Uruk, the Erech of Genesis, the name of which means 'the city of the land,' or capital. The next most important city in this southern region was Ur, the sacred city of the Moon-god, the ruins of which are marked by the mound of Mugheir, on the west bank of the Euphrates, the city from which Abram came. Larsa (Senkereh), the Ellasar of Gen. xiv., Sengul or Kulunu, the Calneh of Genesis, now marked by the ruins of Tello on the Shat-el-Hic, and Eridhu, the most sacred city of South Babylonia, called frequently the 'Holy City,' were all seats of local rulers. The first ruler who succeeded in combining those various city kingdoms into one consolidated

whole was Ur-badu, whose reign must be placed about 2700 B.C. This ruler restored temples in nearly all the above-mentioned cities, and appointed 'priest viceroys' to rule in them. He was succeeded by his son Dungi, who left us a large number of inscriptions. Already an civilisation had made great progress. The sciences, especially astronomy, were studied; the ships of Chaldea navigated the Persian Gulf; and the first really historical chronicle, 'to this period, and is found on a statue of Hammurabi, which shows the Babylonians already in contact with Elam and the nations to the west. The wars with Elam form the chief features of the history of this period. In 2280 B.C. a powerful confederation of Elamites under Kudur-nakhundi invaded South Chaldea, and sacked the capital, Erech, carrying away the statue of the divine patroness Nana or Ishtar. This dynasty lasted until about 2120 B.C., and was very powerful, as shown by the numerous inscriptions of the kings found in various parts of Babylon. Of the kings of this period two are specially important—viz., Kudur-mabug, who appears to have been lord-paramount of the confederation of kings, and who claimed the title of 'lord of the west,' or Syria, and his son, Eri-aku, who was ruler of Larsa. This latter ruler is almost universally identified by Assyriologists with the Arioch, king of Ellasar, mentioned in Gen. xiv. This dynasty was overthrown by the powerful usurper, King Khammuragas, who appears not to have been of native Babylonian origin, but rather a Kassite or Cossean who had settled in the land and availed himself of this period of depression to seize the throne. This Kassite dynasty is one of the most important periods in Babylonian history, as great political changes took place at this time. It was at this period that Babylon began to assume its position as the capital of the whole empire. Khammuragas rebuilt the temples of Bel at Babylon, Nebo in Borsippa, and restored several of the sacred edifices in South Babylonia, at Ur, Erech, and Larsa, which had suffered at the hands of the Elamite invaders. His greatest public work, however, was the construction of a canal called the river of Khammuragas, 'joy of men,' which there is little doubt was the Nar Malka or royal river of the classics. This canal crossed North Babylonia, passing through Sippara, and is now represented by the Yusefieh canal, one of the few ancient canals navigable to the present day. This dynasty lasted about 180 years, the founder himself ruling 45. The very numerous collection of inscriptions of this period in the British Museum



Fig. 2.—Inscription upon the Sargon Stone.
(From a Drawing by Mr Rylands.)



Fig. 3.—King Merodach-Idin-Akhi.
(From a Basalt Stele in the British Museum, about the 12th century B.C.)

whole was Ur-badu, whose reign must be placed about 2700 B.C. This ruler restored temples in nearly all the above-mentioned cities, and appointed 'priest viceroys' to rule in them. He was succeeded by his son Dungi, who left us a large number of inscriptions. Already an civilisation had made great progress. The sciences, especially astronomy, were studied; the ships of Chaldea navigated the Persian Gulf; and the first really historical chronicle, 'to this period, and is found on a statue of Hammurabi, which shows the Babylonians already in contact with Elam and the nations to the west. The wars with Elam form the chief features of the history of this period. In 2280 B.C. a powerful confederation of Elamites under Kudur-nakhundi invaded South Chaldea, and sacked the capital, Erech, carrying away the statue of the divine patroness Nana or Ishtar. This dynasty lasted until about 2120 B.C., and was very powerful, as shown by the numerous inscriptions of the kings found in various parts of Babylon. Of the kings of this period two are specially important—viz., Kudur-mabug, who appears to have been lord-paramount of the confederation of kings, and who claimed the title of 'lord of the west,' or Syria, and his son, Eri-aku, who was ruler of Larsa. This latter ruler is almost universally identified by Assyriologists with the Arioch, king of Ellasar, mentioned in Gen. xiv. This dynasty was overthrown by the powerful usurper, King Khammuragas, who appears not to have been of native Babylonian origin, but rather a Kassite or Cossean who had settled in the land and availed himself of this period of depression to seize the throne. This Kassite dynasty is one of the most important periods in Babylonian history, as great political changes took place at this time. It was at this period that Babylon began to assume its position as the capital of the whole empire. Khammuragas rebuilt the temples of Bel at Babylon, Nebo in Borsippa, and restored several of the sacred edifices in South Babylonia, at Ur, Erech, and Larsa, which had suffered at the hands of the Elamite invaders. His greatest public work, however, was the construction of a canal called the river of Khammuragas, 'joy of men,' which there is little doubt was the Nar Malka or royal river of the classics. This canal crossed North Babylonia, passing through Sippara, and is now represented by the Yusefieh canal, one of the few ancient canals navigable to the present day. This dynasty lasted about 180 years, the founder himself ruling 45. The very numerous collection of inscriptions of this period in the British Museum

whole was Ur-badu, whose reign must be placed about 2700 B.C. This ruler restored temples in nearly all the above-mentioned cities, and appointed 'priest viceroys' to rule in them. He was succeeded by his son Dungi, who left us a large number of inscriptions. Already an civilisation had made great progress. The sciences, especially astronomy, were studied; the ships of Chaldea navigated the Persian Gulf; and the first really historical chronicle, 'to this period, and is found on a statue of Hammurabi, which shows the Babylonians already in contact with Elam and the nations to the west. The wars with Elam form the chief features of the history of this period. In 2280 B.C. a powerful confederation of Elamites under Kudur-nakhundi invaded South Chaldea, and sacked the capital, Erech, carrying away the statue of the divine patroness Nana or Ishtar. This dynasty lasted until about 2120 B.C., and was very powerful, as shown by the numerous inscriptions of the kings found in various parts of Babylon. Of the kings of this period two are specially important—viz., Kudur-mabug, who appears to have been lord-paramount of the confederation of kings, and who claimed the title of 'lord of the west,' or Syria, and his son, Eri-aku, who was ruler of Larsa. This latter ruler is almost universally identified by Assyriologists with the Arioch, king of Ellasar, mentioned in Gen. xiv. This dynasty was overthrown by the powerful usurper, King Khammuragas, who appears not to have been of native Babylonian origin, but rather a Kassite or Cossean who had settled in the land and availed himself of this period of depression to seize the throne. This Kassite dynasty is one of the most important periods in Babylonian history, as great political changes took place at this time. It was at this period that Babylon began to assume its position as the capital of the whole empire. Khammuragas rebuilt the temples of Bel at Babylon, Nebo in Borsippa, and restored several of the sacred edifices in South Babylonia, at Ur, Erech, and Larsa, which had suffered at the hands of the Elamite invaders. His greatest public work, however, was the construction of a canal called the river of Khammuragas, 'joy of men,' which there is little doubt was the Nar Malka or royal river of the classics. This canal crossed North Babylonia, passing through Sippara, and is now represented by the Yusefieh canal, one of the few ancient canals navigable to the present day. This dynasty lasted about 180 years, the founder himself ruling 45. The very numerous collection of inscriptions of this period in the British Museum

shows that at this time Babylonia was occupied by a much mixed population, consisting of Sumero-Akkadians, Elamites, Kassites, and a large Semitic element. The Semites appear principally as traders and merchants.

The three succeeding dynasties, extending over a period of about six hundred years, consisted of a mixture of Semitic and non-Semitic princes, who ruled with Babylon as capital. The history of this period is chiefly to be derived from the Tablet of Synchronism and only a few Babylonian records of the period have been preserved. One of the most important Babylonian inscriptions of this period is the memorial stone of Nebuchadnezzar I., 1150 B.C., a usurper who seized the throne, and waged war against the rising empire of Assyria. In this inscription the king records the result of a campaign against the Elamite chiefs in the region of Namri or Kurdistan and on the banks of the Uhi River, on which the city of Susian was afterwards built. The description of the campaign undertaken in the hot summer months is extremely graphic for so ancient a document. 'In the month Tammuz he took the road, the rocks were burning and scorched like fire, from the gardens was burned all vegetation, there was no water in the springs, and cut off were the drinking-places, the strength of the great horses wearied, and to the warlike hero his courage returned.' The writer thus describes the battle in which the Babylonians were undoubtedly worsted, and only saved from complete defeat by the aid of the governor of an adjacent city who refused to surrender to the Elamites. In return for this the city has a charter of freedom granted it, declaring it free from taxes and from the usual levy for men in the time of war. The history is after this date chiefly to be derived from Assyrian sources, and it is not until the time of Nabunazir, the Nabonassar of the Canon of Ptolemy, that we have any complete sequence of Babylonian history. Our information is now chiefly derived from the important but unfortunately fragmentary Chronicle tablet already spoken of. Nabonassar, whose reign forms an important epoch in Babylonian history, ascended the throne in 747 B.C., and ruled for fourteen years. During his reign, the country was twice invaded by the Assyrians, and though they claim the victory, they do not seem to have shaken the king on his throne. Nadius, the Nadius of Ptolemy, who succeeded to his father's throne in 734 B.C., only ruled for two years, when one of the popular revolts unseated him and placed Ukinzir, the Chimzoros of Ptolemy, on the throne. In the third year the country was invaded by the armies of Tiglath-pileser III., king of Assyria, who drove the Babylonian king from his capital into the marshes of South Babylonia, where he found him and put him to death, ascending his throne under the Babylonian name of Pul or Pal. This conquest of Babylonia in 729 B.C. was a very important event in the history of the kingdom, for it brought the two courts of the north and south kingdoms once more into close relationship. The death of Sardanapalus IV., king of Assyria, and the usurpation of the throne by Sargon the Tartan in 722 B.C., was the opportunity seized by the Babylonians for once more becoming independent under the leadership of a prince of very ancient descent—Merodach-baladan II. This prince was one of the most popular rulers of the middle Babylonian kingdom, and was supported by all classes of the people as well as by the Elamite court, who were the most powerful opponents of Assyria. For twelve years the wars in Syria and other parts of the empire kept the Assyrians from despatching sufficiently strong forces to the south to crush this powerful prince. In 712 B.C. Sargon was purposing to march

into Babylonia, when a counter-action was caused by the Babylonian prince sending an embassy to Hezekiah and the other princes of Syria, and raising a revolt which called the invaders away (2 Kings, xx. 6); but in 710 B.C. the storm broke, and Sargon captured Babylon, proclaiming himself king. On the assassination of Sargon in 705 B.C. Merodach-baladan returned, and after a reign of some nine months was driven from the land by Sennacherib, seeking refuge in the Elamite provinces on the east shore of the Persian Gulf. For some years Babylonia was now ruled by viceroys and princes appointed by the kings of Assyria, although several native princes attempted revolt. In 688 B.C. Sennacherib, after a very severe campaign, in which he defeated the allied Elamites or Babylonians, became sovereign of the two kingdoms. His son and successor, Esar-haddon, attempted to carry out a policy of a more conciliatory kind, and divided his time between the two courts; but the violent opposition of Egypt in Syria weakened his power, and the Elamites and Babylonians constantly harassed. Shortly before his death he appointed his son Samsas-sun-yukin, the Samsaduchinos of Ptolemy, ruler, which appointment was confirmed by his son and successor Assur-bani-pal. This prince, tempted by the intrigue of the Babylonian priests, revolted against his brother, and was defeated after a terrible war, in which Babylon, Sippara, and Borsippa were besieged, and burned himself in his palace, 647 B.C. Kandalanu, who succeeded him, was little more than a viceroy, depending in every way upon the Ninevite court, although tablets are dated in his reign. On the disruption of the Assyrian empire after the death of Assur-bani-pal, the throne of Babylon was seized by Nabu-abla-utzar, or Nabopolassar, the general of the Babylonian garrison, who had married a Median princess, and was himself no doubt of collateral descent from the royal line of Babylonian kings. The general disruption of the states of Western Asia which took place in 625 B.C., subsequent upon the inroad of a large mass of Aryan and other invaders from the East, afforded the Babylonians an opportunity for throwing off the hated yoke of Assyria, and Nabopolassar was proclaimed king in 625 B.C. He was succeeded in 604 B.C. by his son Nebuchadnezzar, one of the greatest sovereigns who ever ruled over the ancient empire. During a long reign of forty-three years the prince succeeded in recovering the long lost provinces of the kingdom, and once more making Babylon queen of nations. He not only restored the empire and rebuilt Babylon, but almost every temple and edifice throughout the land underwent restoration at his hands. It is an astonishing fact that not a single mound throughout Babylonia has as yet been opened by the explorers which has not been found to contain bricks, cylinders, or tablets inscribed with his name. In 599 B.C. he captured Jerusalem, and sent Jehoiakim captive to Babylon, and eleven years later, owing to the still disturbed state of the kingdom (588 B.C.), he destroyed the city, and removed most of the inhabitants to Chaldaea. Nebuchadnezzar was succeeded in 561 B.C. by his son Evil-merodach, who released Jehoiakim, but was murdered by his brother-in-law, Nergal-sharezer, who was the *rab muklu* or 'chief seer' of one of the temples. His reign lasted until 556 B.C., his son Labasi-kudar, the Laborsarchad of Ptolemy, only ruling a few months. The throne was in 556 B.C. usurped by a powerful and active prince Nabu-maid or Nabonidus, the son of a 'chief seer,' whose reign is the most important, next to that of Nebuchadnezzar, in later Babylonian history. The inscriptions of this king are found in almost all temples, and some of them contain

important historical facts. In a cylinder found at Sippara, the king records his restoration of the temple at Kharran, which was destroyed by the Scythians, and in his sixth year, 549 B.C., he records the overthrow of Astyages, king of the Medes, and the capture of Ecbatana by Cyrus. In the king's seventeenth year the whole land of Babylonia was in revolt against him for neglecting the duties of court and religion, leaving all to his son Belshazzar. During the summer of this year Cyrus invaded Babylonia, advancing from the neighbourhood of the modern Bagdad, and reaching Sippara on the 14th day of Tammuz (June), which the garrison yielded without fighting. Two days later, Tammuz 16, Babylon is taken in the same manner. Cyrus appointed Gobryas ruler. Three months later Nabonidus, who was a prisoner, died, and after a week's mourning by the people, was buried on the 4th day of Nisan, 538 B.C. Babylonia now became a Persian province, and under the rule of Cyrus (538-29 B.C.) and Cambyses (529-21), it appears to have been peaceful. On the accession to the throne of Darius, son of Hystaspes, the old rebellious spirit once more asserted itself, and for three years (521-19) the city held out against the Persians under Nadinta-Bel, who claimed to be Nebuchadnezzar, son of Nabonidus. Again, in 513 B.C., the city revolted under Ariakha, an Armenian.

With the overthrow of the Persian monarchy, Babylonia came under the short-lived dominion of Alexander the Great, who died in that city (323 B.C.). Seleucus I., to whom it had been promised at the conference of Triparadisus, contested and won the possession of it from Antigonus (312 B.C.). About 140 B.C., it was taken from the Syrian monarchs by the Parthians. It came into the hands of the Romans only temporarily, first under Trajan (114 A.D.), under Septimius Severus (199 A.D.), and again, under Julian (363 A.D.). When in 630 the successors of Mohammed put an end to the new Persian monarchy of the Sassanides, the province of Babylonia, where Bagdad was built (762-766), became the seat of the califs till 1258. Since 1638, when the Turks, for the second time, took it from the Persians, it has been under the dominion of Turkey, divided into the pachalics of Bagdad and Basra.

The classic writers represent the civilisation of the ancient Babylonians as of a high stamp. The government was despotic, of a kind to suit a crowded, luxurious, and effeminate population. Arts and commerce were highly flourishing—the last was carried on by caravans with Bactria, Persia, and Media, perhaps as far as India, and by shipping on the Persian Gulf with Arabia. Babylonia was famous for its dyes, its cloths, and embroideries, especially for the manufacture of rich carpets with inwoven figures of strange animals and arabesques, such as we yet see on the Nineveh sculptures. The general prosperity was such, that Babylonia and Assyria together were able to pay to Persia, in the time of Darius Hystaspes, a yearly tribute of 1000 talents (upwards of £280,000) a sum greater than that contributed by any other province.

Literature. The Babylonians, that is, the old Sumero-Akkadian population, were essentially a literary people, and the scribe caste comprised many of the highest in the land. It is evident from the numerous inscriptions as early as 2000 B.C., which are the work of private persons, that a certain amount of education was bound to be attained by every Babylonian, and that this implied access to the temple schools and libraries is certain from the directions given in certain tablets, which show the student how to ask for the works he required from the libraries. The tablets were all

numbered and arranged in order according to the various sections to which they belonged, and directions were given to order the works by the numbers attached to them. The literature in the Babylonian libraries was, like the religious development in the earlier stages, largely influenced by local schools of thought, and consequently certain branches of literature represent the teachings of certain temple schools. In the most ancient school of Eridhu, the sacred city of Ea, there was established the chief centre of a school of religio-magic, who devoted themselves almost entirely to the study and composition of works on magic and kindred subjects. In this city the series of tablets known as the books of 'spells relating to diseases of the head,' consisting of more than fifty tablet volumes, was composed. These remarkable works, as M. Lenormant has shown, bear a close resemblance to the Atharvaveda or Black Veda of the Aryans. The epic poem of Gizdhubar, with its twelve books arranged according to the signs of the zodiac (see ASSYRIA), was probably the production of the school of Ereh, the most ancient capital of the land, but was traditionally attributed to a scribe named *Sin-likai-inini*. Other poems, such as the Sumero-Akkadian version of the war in heaven, which describes the attack of the seven evil spirits on the moon, may be ascribed in all probability to the city of Ur. One of the most perfect specimens of Babylonian literature is the tablet describing the war in heaven between Merodach and the demon Tiamat, which comes from the library of the temple of Nebo at Borsippa. Of this tablet we have both Assyrian and Babylonian versions. This poem describes in most beautiful words the commission of Merodach by the great gods in assembly for the work of crushing the evil demon. The fight of this terrible nature-war, and the conquest of the evil one and his allied spirits of darkness, is all described, and then the tablet closes with a remarkable hymn of praise to the victor. In fact, the literature contained in these libraries comprised every branch of learning known at the time. Historical and mythological documents, religious compositions, legal, geographical, astronomical, and astrological treatises, magic and the arts of divination, poems, fables, and proverbs. In this last branch one of the most curious specimens is the legend of the bird-god Zu, 'the wise one,' who stole the tablets of destiny and the secrets of the gods, and, like Prometheus, brought them down to earth, he himself being driven away to the mountains for his sin. One important distinction between the literatures of Babylonia and Assyria remains to be noticed: in the former the names of the writers are known in most cases, while in the latter all merit is appropriated by the king. Most of the classic works of Chaldaea were copied by the Assyrians under Assur-bani-pal, and placed in the library and at Nineveh, and became part of the literature of the northern empire (see ASSYRIA).

Religion.—During the long period over which the monuments and inscriptions extend, numerous changes took place in the religion of Babylonia. The early speculations of the Sumero-Akkadians were a rude fetish-worship or Shamanism, according to which every object in nature was regarded as the abode of an indwelling spirit or life (*Zi*), which controlled its actions and its relationship to man. Round this primitive creed grew up a body, not of priests, but rather of medicine-men, or exorcists, who dealt only with the malevolent spirits of sickness and disease, and the hostile powers of nature injurious to the life of man.

The liturgy of these priests is found in the hymns and magical texts, large numbers of which have been preserved in the libraries of Nineveh and

Babylon. Gradually the vast host of spirits became grouped in a hierarchy of the spirits of the heavens and the earth; and from these came the first gods of the Sumero-Akkadian pantheon. These two great spirits, so frequently invoked in the sentence, 'Oh Spirit of the heavens, exorcise thou! Oh Spirit of earth, exorcise thou!' became no longer spirits, but *Dingri* or 'creators,' a word explained by the Semitic *Elu*, 'god,' and the parents of all the other gods. Under this new development a number of local gods grew up, and each city had its divine patron, who was worshipped there with a strict henotheistic worship—that is, he alone in his sacred city was supreme among the gods. Thus, in a beautiful litany from Ur of the Chaldees, this phase of the religious life is clearly shown. 'In heaven who is supreme? Thou alone art supreme! On earth who is supreme? Thou alone art supreme!' Yet the same words appear in the local liturgies to Merodach in Babylon, and to Nebo in Borsippa. One of the earliest seats of religious culture in Chaldea appears to have been the city of Eridhu, then on the shore of the Persian Gulf, where was the seat of Ea, 'the lord of the sea.' This strange divinity, whose worship is most ancient, bears the titles of 'lord of the wave,' 'king of the deep,' 'lord of rivers,' and 'the god of boatmen;'

the modern Niffer. This great god, whose name means the 'lord of the ghost-land,' was also the ruler of 'earth and mankind,' and, according to one version of the Deluge legend, was the deity who caused the destruction of the wicked men. The wife of the 'lord of the ghost-land' was the goddess Ninkigat or Allat, 'the lady of the great land' of Hades. She was the queen who ruled in the dread 'land of no return,' and 'whose city and palace walls were clothed in dust, the inhabitants thereof wearing robes of feathers like birds.' The child of this dread pair was Namtar, 'the demon of fever and goddess of fate,' who carried out the behests of his parents in spreading disease and death abroad. One of the most holy of the descendants of Mul-lil was the Moon-god, who soon, however, became a greater even than his father, and in his sacred city of Ur, became the centre of a great religious development spreading to Kharran, and Syria, and Arabia. In the city of Ur, 'the dwelling of the moon-god' was worshipped under the name of Nannar or Nanak, both names being preserved to us in the legends of Hellenic Asia. Some of the hymns to this deity are among the most beautiful in the sacred poetry of Chaldea. 'Merciful one, begotten of the universe, who founds his illustrious seat among living creatures. Long-

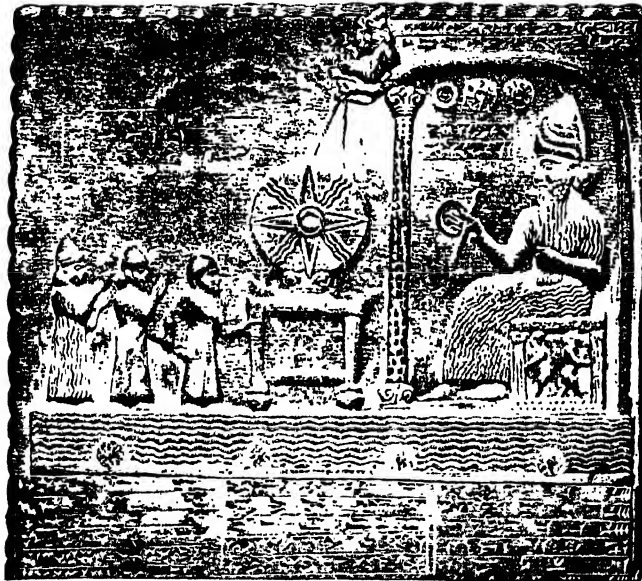


Fig. 4.—Upper half of 'Sun-god Tablet'—priests and king adoring the sun's disc (British Museum). (From a Photograph by Practorius.)

also we find him called 'lord of wisdom,' 'he who knows all things,' 'lord of laws,' all of which titles aid us in identifying him with the mysterious fish-divinity, who taught, according to Berossus, the elements of culture to the first inhabitants of Chaldea. The consort of Ea is Damkina, 'the lady of the earth,' who personified the earth just as Ea represented the sea. Water and the earth were, according to the ancient theology of the city of Eridhu, the two elements out of which all the world proceeded. This pair had a son, Tammuz, 'the only begotten one,' who, according to the creed of Babylon, was replaced by Marduk or Merodach. The worship of Tammuz in association with his sister and consort Istar, reached a high development in Babylonia, and spread over the whole of Western Asia. Next in importance among the local deities came the god Mul-lil, the elder Bel of the Semitic creed, whose sacred city was Nipur,

suffering father, full of forgiveness, whose hand upholds the lives of mankind. Lord, thy divinity is as the wide heavens, and fills the sea with its fear.' 'On the surface of the peopled earth he bids the sanctuary be placed: he proclaims their name. The father, the begotten of gods and men, who causes the shrine to be founded, who establishes the offering, who proclaims dominion, who gives the sceptre, who shall fix destiny into a far-distant day.' In the creed of the ancient population of Babylonia, the moon took precedence of the sun-god, the latter being the son of the former. This was probably due, as Professor Sayce has suggested, to the fact that Mul-lil was lord of the night-sky.

However, under the influence of the Semites, especially those of the northern cities of Sippara and Akkad, Samas the sun-god soon became the head of a special cult which absorbed many of the other older gods, and each city had its local sun-god or solar hero. The old centre of sun worship in Chaldea was the city of Larsa, 'the dwelling of the sun-god,' where many of the oldest kings restored the great temple. It was, however, in the northern city of 'Sippara of the sun,' and in the most ancient temple of E Bībara, 'the house of lustre,' where this worship attained to its highest development. The spread of the solar worship in Chaldea received a strong impetus from the patronage of the great Semitic ruler, Sargon I. (3800 B.C.), who restored his temple. The tablet, of which a representation is given (fig. 4), was erected by Nebopoladan, king of Babylon, an ardent votary of the worship of the sun-god, about 900 B.C. The god is seated on a square seat, placed inside a porch supported by pillars, and holds in his hand a ring and a short rod. Before the pillar stands a stool with legs, bearing a figure of the disc of the sun, apparently supported by cords which are held in the hands of two attendant spirits from the roof. Of the three figures standing with their faces turned towards the disc,

the first is a priest who holds the stool with his left hand, while with his right he grasps the left hand of the second figure—the king, whose right hand is raised in adoration to the god. The third figure behind the king has both hands raised in adoration. Above the heads of the three figures are the three lines of inscription, 'the image of the sun-god, the mighty lord, the dweller in the temple of Parra (or Bara), which is within Sippara.' Under the god are carvings of two figures, and above are three circles, representing the new moon, the sun, and Istar or Venus. Exactly under these runs another inscription, and two lines run along the roof. Underneath the whole are six columns of Babylonian writing, consisting of hymns to the sun. The rise and spread of the sun-creed in Babylonia mark a great change in the religious life of Chaldea in the meeting and amalgamation of the Semitic and Akkadian religious thought. We have no longer to deal with the dread Mul-lil of the ghost-land, but with a supreme Bael, the head father and creator of the universe, who rapidly absorbed all the other solar deifications in the old Sumero-Akkadian pantheon. Dumzi, or Tammuz of Eridhu, Ningirzu of Sergul, Sikkh-mulu-khi of Eridhu and Babylon, all became absorbed in Bel-Merodach or Marduk of Babylon or Samas of Sippara. It is to this age that we must assign the growth and compilation of the great epic of Gilgamesh, the sun-god, which embodies so many solar legends and solar characters. From this religious reformation there grew up the worship of the great Bel-Merodach, once a solar deity, but gradually as the city became the capital of the empire this local deity became the head of the pantheon, and the national god, as Assur became in Assyria. The position which Merodach attains under the religious school of the later empire is a near approach to monotheism, and he visits all neglect of his worship with severe punishment. It was for neglect of his supreme power as lord of Babylon and Babylonia that Nabonidus was visited with the rod of the Persian, and his power was recognised by the conqueror, for Cyrus calls himself the 'servant of Merodach.' Zirpanit, the consort of Merodach, was but a reflex of her lord and master, and as the goddess of wisdom she retains some traces of the former connection between Merodach and his father Ea. It is to this pair that the invocations of the kings of the later Babylonian empire are directed. The temple of Bel-Merodach or the tomb of Belus was one of the wonders of the world. The temple stood on the east side of Babylon, and was certainly as old as 2150 B.C., when Babylon became the capital of a consolidated empire. It bore the Akkadian name of E-Sagilla, 'the house of the raising of the head.' Its beautiful entrance-gate, like Solomon's porch in the temple, was called 'the gate of glory,' and just within which was the sacred seat or couch of Zirpanit, the Succoth-benoth of the Scriptures (2 Kings, xvii. 30). In the temple itself was the *papakha* or shrine of Merodach, 'the holy of holies of the gods of destiny,' which was separated from the *ekal* or main nave or holy place by a veil. In the centre of the court rose the great *Ziggurat*, called 'the house of the foundation of heaven and earth.' The ceremonies of the service in this temple present a remarkable resemblance to the Temple of the Jews. The daily morning and evening sacrifice, the meat and drink offering, the free-will offering, the sin offering, and the show-bread, all formed part of the ritual of this temple. Next in importance to Merodach was the god Nebo, who, with his consort Tasmit, was worshipped in the city of Borsippa (see ASSYRIA). Here he was associated with his goddess Tasmit, and presided at the temple of E-Zida, 'the ever-

lasting house,' the chief university of Chaldea. Several of the minor gods and spirits survived in the new and highly developed cult—Ninep or Uras, the god of war and the chase; Nergal, the god of death; Gibil, the fire-god; and many local spirit-demons. In addition to the numerous native gods, the Babylonians incorporated many foreign divinities into the pantheon, especially those of their Kassite rulers, such as Samalia, Suga Muna, and Kit, the Kassite sun-god.

The City of Babylon.—The accounts that we find in the ancients of the origin, the greatness, and the structure of the city are exceedingly confused. The god Belus is named as its founder, and also Queen Semiramis; how we are to understand the two statements is not explained. Semiramis, according to the account of Diodorus, employed on it two millions of workmen, collected from all parts of her dominions. With the capital of the older kingdom, the accounts of the ancients known to us have, for the most part, nothing to do; they are all to be referred to the resuscitated and adorned residence of Nebuchadnezzar. Herodotus gives a description of the city, as if from his own observation. It stood on both sides of the river, in the form of a square, the length of whose sides is variously given; by Herodotus it is stated at 120 stadia, making the whole circumference 60 miles. It must be remembered, however, that the walls, like those of most oriental towns, inclosed rather populous districts than cities, so that the whole mass of the population might easily find shelter within the space inclosed. It was surrounded by a wall 200 cubits high, and 50 cubits thick, and furnished with 100 brazen gates—the last number is raised by Diodorus to 250. The city was built with extreme regularity, with broad straight streets crossing one another at right angles; and the two parts were connected by a roofed bridge built of hewn stones, fastened together with iron clamps. Of this bridge, not a trace has yet been discovered. The western part of the city is undoubtedly the older, belonging to the early and properly Babylonian dynasty. Here stood, in the middle of the city, as it is described, the famous temple of Belus or Bael, called by the Arabs, Birs Nimrod (see BABEL, TOWER OF). The next important point on the west side is the mass of ruins called Mujellibe, which was probably the royal citadel of the old Babylonian monarchy. On the east side of the river stood the buildings of the Neo-Babylonian period, among which the 'Hanging Gardens' of Semiramis are to be singled out as one of the wonders of the world. Of these gardens Diodorus has left us a detailed description. Their ruins may be recognised in the mound called El-Kasr. The city suffered greatly from the Persian conquest. When it revolted under Darius I., and, after a siege of two years, was recaptured through the ingenuity of Zopyrus, the outer walls were demolished. Xerxes plundered the temple of Belus, which had been hitherto spared, and Herodotus found it empty. Although the Persian kings made Babylon their residence, nothing was done for the restoration of the city; and Alexander the Great, who, on his entrance, in 331 B.C., had promised the inhabitants to rebuild the ruined temple, was unable even to clear away the rubbish, although he employed 10,000 workmen for two months. After his death in the palace of Nebuchadnezzar, and the foundation of Seleucia on the Tigris by Seleucus Nicator, Babylon went rapidly to decay. This was partly owing to the new city's being built of the materials of the old, and partly to the want of durable materials for monumental buildings. Stones of any size had to be brought from the mountains of Armenia; their place was mostly supplied by burned brick. As early as the

time of Pausanias, there was little to be seen but the ruins of the walls. The older Arabian geographers know, indeed, of a village, Bâbil, but speak more of the great masses of ruins. Since the time of Della Valle, who erroneously looked upon the ruin Mujellibe as the tower of Belus (in which he is followed by Rennel), the site of Babylon has been the object of many travels and researches. The greater number of the explorers, among whom Rich is the most distinguished, consider the town of Hillah, with 7000 inhabitants, as the representative of the ancient Babylon. The great masses of ruins, from which we must not, with Rennel, exclude the Birs Nimrud, embrace, indeed, an enormous extent, but agree perfectly with the accounts of the ancients in being arranged in the form of a square.

See Oppert, *Histoire des Empires de Chaldée et d'Assyrie* (Versailles, 1865); Layard, *Ninereh and Babylon* (1867); Loftus, *Travels and Researches in Chaldaea and Susiana* (1857); Lenormant, *La Langue primitive de la Chaldée* (1875), and *Manuel d'Histoire ancienne de l'Orient* (9th ed. 3 vols. 1882); Sayce, *Ancient Empires of the East* (1884), *Fresh Light from the Ancient Monuments* (1885), and *Hibbert Lectures* (1887); Sir H. C. Rawlinson, *Cuneiform Inscriptions of Western Asia* (a British Museum publication, 5 vols. 1861-1884); Delitzsch, *Wo lag das Paradies?* (1881); Delitzsch and Haupt, *Assyriologische Bibliothek* (1880); Perrot and Chipiez, *A History of Art in Chaldaea and Assyria* (1884; Eng. trans. 2 vols. 1884); Pinches, *Guide to the Nimrud Central Saloon*, *British Museum* (1886); the *Transactions of the Society of Biblical Archaeology* (1872-87); and the *Babylonian and Oriental Record* (commenced 1886).

Babylonish Captivity, the deportation, under Nebuchadnezzar, of a large portion of the principal inhabitants of Judah, after the fall of Jerusalem, 586 B.C. It must be carefully distinguished from the carrying into Assyria of a large number of the inhabitants of the northern kingdom—the ten tribes—by Sargon, the successor of Shalmaneser, as early as 721. A large number of the inhabitants of Judah had been already carried off to Babylon in 597, when Zedekiah had become king over the remainder. It was not long before these excited the anger of the powerful Chaldean king, and the second capture of the city and captivity of the inhabitants put an end to the kingdom of Judah. They were carried to Babylon, and there they remained in tolerable comfort for 56 years, though the duration of the Captivity is usually reckoned at 70 years, dating from the earlier captivity. Many of them acquired property, and even riches; some were called to court, and even raised to high offices in the state. They were allowed the free exercise of their religion, and here Ezekiel and the unknown author of the last part of the book of Isaiah gave hope to the spiritual aspirations of the despondent people. When Cyrus overthrew the Babylonian empire (538 B.C.), he allowed the Jews to return to their own country, but only 42,360 of the tribes of Judah, Benjamin, and Levi are said to have returned. They found the depopulated territory occupied with a mixed population from the surrounding tribes and the residue of the Jewish population; and with the religious isolation they had learned in Babylon, refused to recognise these as members of their own community. See JEWS.—The name is frequently applied in church history to the exile of the popes at Avignon from 1309-77.

Babyroussa. See BABIROUSSA.

Baccarat (Fr. *Baccara*) is one of the most widespread French games of chance, played for money between a banker and several punters. In Britain, as a game of cards other than a game of skill, it is treated as 'unlawful.' See GAMBLING.

Bacchiglio'ne, a river of Northern Italy, rising in the Alps, and flowing 90 miles south-eastward, through the plain of Padua, and past the town of Vicenza, till it falls into the Adriatic 3 miles south of Chioggia.

Bacchus, one of the names among the Greeks and the usual name among the Romans for Dionysus, the god of wine. Originally a mere epithet or surname, it does not occur in Greek writers till after the time of Herodotus, and its use is generally confined to the god in his more riotous aspects. The name Dionysus occurs also in Latin, though not in the Augustan poets. His worship was introduced into Rome from Greece, and was amalgamated with the worship of Liber, an old Italian deity who presided over planting and fructification. The Liberalia, celebrated every year on the 17th of March, on which day youths received the manly toga, must be distinguished from the triennial Bacchanalia or Dionysia. The latter, soon after its introduction into Italy, became the cloak for shameful immorality and crime, but was finally prohibited by the senate, 168 B.C. See DIONYSUS.

Baccio'chi, MARIA BONAPARTE, eldest sister of Napoleon Bonaparte, born at Ajaccio, Corsica, 1777, married Felice Bacciochi, and was created by her brother in 1805 Princess of Lucca, Piombino, Massa, and Carrara, and in 1809 Grand-duchess of Tuscany. She shared her brother's fall, and spent her last years in Austria, dying on her estate near Trieste, August 7, 1820. Her husband died in 1841; her only son, in 1833; and her only daughter, the Countess Camerata, in 1869.

Baccio della Porta. See BARTOLOMEO, FRA.

Bach, JOHANN SEBASTIAN, one of the supremely great musicians of the world, was born at Eisenach in 1685, probably on 21st March, as he was baptised on the 23d of the month. The family, which traced its origin from one Veit Bach, a baker and miller who lived about 1550, and was exceedingly fond of music, had already produced many musicians, among whom two brothers, cousins of Sebastian's father, Ambrosius, were the most eminent. Johann Christoph and Johann Michael Bach wrote several excellent motets, and their writings had considerable influence on their illustrious kinsman. The love of music was so general throughout the family, that at Erfurt, where one branch of the clan was settled for many years, the town-musicians were commonly called 'the Bachs,' even though there might not be any member of the family among them at the time. Before he was ten years old, Sebastian lost his father, and was placed under the care of an elder brother, Johann Christoph, who was organist at Ohrdruf. He undertook the boy's musical education, but apparently in dread of his too rapid progress, kept from him a manuscript volume of organ pieces by various masters. Sebastian managed to obtain possession of the book by drawing it through the lattice of the bookcase in which it was locked away, and to copy its contents, working only by the light of the moon for fear of detection; his sole reward for six months' labour was the confiscation of his copy on its discovery by his brother. In 1700 he entered the choir of St Michael's school at Lüneburg, remaining there, after his beautiful soprano voice had broken, as accompanist on the harpsichord, and also as a violinist. During this period he made several excursions to Hamburg, where a cousin of his, Johann Ernst Bach, was living, in order that he might hear the famous organist Reinken play. In 1703 he was given a court appointment at Weimar, where he had the opportunity of hearing a great deal of Italian instrumental music; in the following

year, while on a visit to some of his many relations at Arnstadt, he was offered the post of organist to the New Church, and it was here that he began to compose in real earnest. Many of his 'church cantatas' were written here, as well as the famous 'Capriccio on the Departure of a Brother,' composed when his brother, Johann Jakob, went to join the Swedish Guard. In October 1705 he obtained four weeks' leave of absence in order to go to Lübeck and hear Buxtehude, the great Danish organist and composer, who was then nearly seventy years old. Bach was so delighted with him and his compositions that he outstayed his leave of absence, and on his return the authorities censured his conduct in this and other matters, such as accompanying the hymns in a manner that did not suit the taste of the congregation. His intimacy with a cousin of his, Maria Barbara, 'ach, who had lately come to Arnstadt, was also made a ground for reproof; so that he began to look for a new post. This he found at Mühlhausen, where he was installed in June 1707. On 17th October of that year he returned to Arnstadt in order to marry the cousin just mentioned, and settled down to his new work. He only remained at Mühlhausen one year, since a far more congenial sphere of action presented itself at Weimar, where he was now appointed court organist. The nine years spent at the ducal court did much to perfect Bach's style as a composer for the organ, and some of the best of his cantatas were also written there. The works of the great Italian composers of the time were studied in such a manner that Bach soon became complete master of their style of writing, and thus prepared for his own instrumental works which were to be produced later. Many journeys were made from Weimar, the most famous of which is one that resulted in the discomfiture of a French harpsichord player named Marchand. In 1717 Bach went to Dresden, where this man's playing was universally admired; the merits of the two musicians were hotly discussed, and it was determined that Bach should challenge Marchand to a public musical competition. The Frenchman accepted the challenge, but when the day came, was nowhere to be found. He had enough perception to see that the competition could only bring defeat upon himself, and so had beaten a retreat. Soon after this, Prince Leopold of Anhalt-Cöthen offered Bach the post of capellmeister at his court, a situation which he retained till 1723. A journey to Halle, made with the purpose of seeing Handel, who was there at the time, failed of its object, as Bach got there too late; nor was a subsequent attempt to meet his great contemporary more successful. A severe calamity befell him in 1720, when his wife died during his absence with the prince at Carlsbad; he bore her loss, however, manfully, and went on with his accustomed duties, paying another visit to Reinken at Hamburg in the same year. In December 1721 he married Anna Magdalena Wilkens, daughter of the court trumpeter at Weissenfels. She was extremely musical; much of his music exists in copies made by her hand, and many of his works for keyed instruments were written for her use. Most of the well-known 'suites' date from this time, as well as many works for stringed instruments. The first half of the wonderful collection of *Forty-eight Preludes and Fugues*, called in Germany *Das Wohltemperirte Clavier*, was also written at Cöthen, the second half being composed many years afterwards. At the end of the year 1722 the post of Cantor of the Thomas-schule at Leipzig became vacant, and after some difficulties and delays Bach was given the appointment. During his residence at Leipzig, all his greatest works for chorus were written, among

which the most important a

the history of the Passion, in the versions of St Matthew and St John respectively, many church cantatas, the total number of which, together with those already mentioned, reached nearly three hundred, and the Mass in B minor. Two movements from this latter work were presented to Augustus III. at one of Bach's frequent visits to Dresden, where he received in 1736 the honorary title of Hofcomponist. A more famous visit was that paid to Frederick the Great at Potsdam, in May 1747. His arrival was announced to the king while a state concert was going on; Frederick immediately laid down his flute, and sent for Bach to come to court just as he was. Some pianofortes made by Silbermann were tried by Bach, who subsequently improvised on a theme given to him by the king. This theme he afterwards worked up in many different ways, and presented the result to Frederick under the title of *The Musical Offering*. This, like the *Art of Fugue*, a work begun about this time, and upon which he was engaged at the time of his death, is a monument of contrapuntal ingenuity and theoretical learning. Some two and a half years after this visit, his eyesight began to give way, and he was persuaded to have recourse to an English oculist then resident in Leipzig. The failure of an operation resulted in absolute blindness, and worse than that, the remedies used affected his health. In July 1750 he was struck with apoplexy, and died on the 28th of the month.

No composer who ever lived can be held to surpass Bach either in the case of his intricate workmanship or in the wealth of invention with which he was endowed. The broad effects which came so easily to Handel, and by which so many thousands have been impressed, did not come within Bach's province; but in his 'B minor mass,' for instance, there are revealed depths of sorrow and heights of ecstatic adoration, which no musician before or since his time has ever attained. That his music appeals less to the untaught than to the cultivated lover of the art, cannot surely be held as a reproach. His greatest compositions for keyed and stringed instruments, taxing as they do the utmost powers of modern artists, must have been far beyond the reach of the exponents of his own day. The pianist of the present day owes to Sebastian Bach not only the system of tuning by which he is enabled to play in all keys, but the method of fingering by which all his fingers are brought into requisition. Several other inventions were made by Bach, but none have been proved of lasting value. One of his sons, Carl Philipp Emanuel, holds an important place in the history of music, since he did much to develop the so-called 'sonata-form,' in which all classical compositions of modern times are cast, and moreover became the teacher of Joseph Haydn. Wilhelm Friedmann, Sebastian's eldest son, dissipated his fine musical talents, leaving comparatively few compositions; the youngest son, Johann Christian, has some interest for Englishmen, since he established himself in London, holding positions there of some consideration. The various biographies of the master, by Forkel (1803), Hilgenfeldt (1850), Bitter (2d ed. 1880-81), and others, have been completely superseded by Spitta's exhaustive work (2 vols. 1873-80; Eng. trans. 3 vols. Novello, 1884-85). Among English books on the subject, Mr R. Lane Poole's contribution to the 'Great Musicians' series, and Mr C. H. H. Parry's *Studies of Great Composers*, may be consulted with advantage.

Ba'charach, a small town of Rhenish Prussia, on the left bank of the Rhine, 30 miles SE. of Coblenz by rail. Pop. (1885) 1840. Its name is said to be a corruption of *Bacchi ara* ('Bacchus')

altar'), and the vine is still largely cultivated in the neighbourhood. Here Blücher crossed the Rhine on January 1, 1814.

Bache, ALEXANDER DALLAS, American physicist, a grandson of Benjamin Franklin, was born at Philadelphia, 19th July 1806, and in 1821 entered West Point military academy. He was appointed professor of Mathematics in the university of Pennsylvania (1827), president of Girard College (1836), and superintendent of the coast survey (1843), in which last capacity he did good service to science. He was author of *Observations at Girard College* (3 vols. 1810-47) and *Lectures on Switzerland* (1870), the latter a posthumous work, as he died at Newport, Rhode Island, 17th February 1867.

Bachelor, a word of uncertain origin, derived, perhaps, with most probability through French from the Low Latin *baccularius*, 'a farm-servant,' originally 'a cow-herd'; from *bacca*, Low Latin for *vaccæ*, 'a cow.' Odd though it seem, this will connect fairly with the special meanings of the word given by Ducange. (1) It was used, he says, to indicate a person who cultivated certain portions of church-lands called *baccularia*, a few belonging to an inferior vassal. (2) It indicated monks in the first stages of monkhood. (3) It was used by later writers to indicate persons in the probationary stage of knighthood - i.e. not squires simply, but knights who, from poverty and the insufficient number of their retainers or from nonage, had not yet raised their banner in the field. (4) It was adopted to indicate the first grade or step in the career of university life. As an academical title, it was first introduced by Pope Gregory IX. in the 13th century, into the university of Paris, to denote a candidate who had undergone his first academical trials, and was authorised to give lectures, but was not yet admitted to the rank of an independent master or doctor. At a later period, it was introduced into the other faculties as the lowest academical honour, and adopted by the other universities of Europe (see DEGREE, UNIVERSITY), and in this sense the Latin form came to be written, at first through mere word-play, *baccalaureus*, as if connected with *bacca lauri*, 'laurel berry.' (5) It came to be used in its popular meaning of an unmarried man, who was thus regarded as a candidate or probationer for matrimony.

The legislation of almost every country, at some period of its history, has imposed penalties on male celibates or bachelors, on the principle that every citizen is bound to rear up legitimate children to the state. In Sparta, at Athens, and at Rome, various penalties were imposed on celibates, various premiums offered for fruitfulness. In England, there are numerous instances of additional or higher taxes being imposed on bachelors and widowers, but apparently more with a view to the revenue than with any other object. Thus, an act was passed in 1695, which granted to the king certain rates and duties upon marriages, births, and burials, and upon bachelors and widowers for five years, 'for carrying on the war against France with vigour.' Every unmarried male above the age of twenty-five had to pay from 1s. to £12, 10s., according to his status. Another instance may probably be found in the higher charge for the servants of bachelors, first imposed by Pitt in 1785, and continued for a considerable time. In the income-tax of 1799, deductions were made on account of children, 5 per cent. being allowed to a person who had a family, and whose income was above £60 and under £400 a year, with corresponding deductions in other cases.

Bachelor, KNIGHT. See KNIGHT.

Bachelors' Buttons, the popular name of the double-flowered yellow or white varieties of Buttercup (*Ranunculus acris*, &c.), frequently cultivated in gardens. It is an excellent and effective perennial, suitable to the herbaceous border, and gives no trouble in cultivation.

Bacillus (late Lat., 'little rod,' diminutive of *baculus*, 'stick'), properly the name of a distinct genus of Schizomycetes, but popularly used in the same sense as bacterium. See BACTERIA.

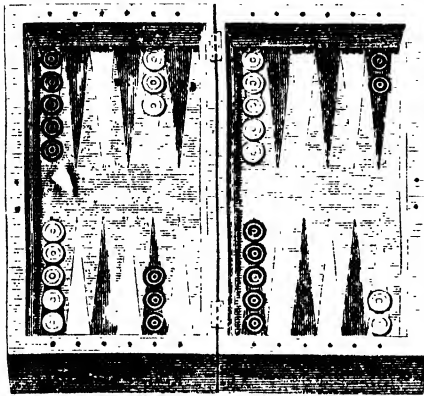
Back, SIR GEORGE, Arctic explorer, was born at Stockport in 1796, and entering the navy in 1808, next year was taken prisoner by the French in Spain. With Franklin (q.v.) he had already shared in three Polar expeditions - to the Spitzbergen Seas (1819), the Coppermine River (1819-22), and Mackenzie River (1822-27) - when he volunteered to go in search of Captain Ross, who was supposed to have been lost in his attempt to discover the North-west Passage. His offer having been accepted, he left London in February 1833, and on the 28th June started from a station of the Hudson Bay Company, on his journey north. After passing a terrible winter with his companions near the Great Slave Lake, he discovered, in 1834, Artillery Lake, and the Great Fish River, or Back's River, which he traced to the Frozen Ocean. Hindered by the ice from proceeding along the coast, he returned by the river, and did not reach England till the autumn of 1835, when he was raised to the rank of captain by order in council, an all but unprecedented honour. In 1836 and 1837 he further explored the Arctic shores; and of this, as in the preceding voyage, he published a vivid description. The Geographical Society, in the latter year, bestowed both its medals upon him; and in 1839 he was knighted. He was made admiral in 1857; but the hardships which he had gone through disabled him from further active service. He died 23d June 1878.

Backergunge. See BAKERGANG.

Backgammon, a game of considerable antiquity in England, where, until the 17th century, it was known by the appellation of 'the tables.' Apparently the word is merely 'back game,' and may have been given because the two players have to bring their men *back* from their antagonist's tables into their own, or because the pieces are sometimes taken up and obliged to go *back* - i.e. re-enter at the table they came from. The French name is *tric trac*. Backgammon is played with a board or tables, men or pieces, dice, and dice-boxes. The introduction of dice into the game, and their constant use in determining moves, makes backgammon essentially a game of chance. The backgammon board consists of two parts or tables, each possessing twelve points, six at each end, which points are coloured white and black alternately. The game is played by two parties, and with 30 pieces or men. Each party has 15 men, one set of 15 being black, and the other white. In beginning the game, the men are placed on certain points on the tables, as shown in the following figure. The game is played with two Dice (q.v.) and two dice-boxes. The dice are common to both; but each party uses his own dice box, and the throws are alternate. If a player throws *doublets*, or both dice of one number, double the number of dots is reckoned; thus, by a throw of two aces, the player does not count 2, but 4. These numbers thrown or accidentally turned up by the dice bear a reference to the points on the tables. In order to understand this connection between the dice and the men, the learner must observe how the men are placed on the points, and the rules by which their shifting from one to another is governed.

The tables are here spread out as if two persons were seated, and about to begin to play. The player owning the white men is seated at W, and the player owning the black men at B. We shall call one player White, and the other Black. White counts round from the ace-point of Black, and Black counts round from the ace-point of White.

W



B

The Backgammon Table.

These ace-points are respectively seen to have two men upon them in opposite corners of the same table. The grand object of the game is for each party to get all his men played round into the table containing the aces, removing them from point to point agreeable to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively, with the number on the other die. Thus, if 4 be thrown by one die, and 6 by the other, a man can be advanced 4 points, and another 6 points; or one man can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by two men belonging to the adversary. If covered by only one man, which is called a *blot*, then that man can be hit, and be removed from the point, and placed on the bar between the tables, his place being taken by the man who has won it. The removal of a man to the bar throws a player considerably behind in the game, because the man must remain out of the play till the dice turn up a number corresponding to an open point on the adversary's table. Being fortunate to get an open point by this means, the man must be entered and wrought round from thence, as in the case of others in the set to which he belongs. The frequent occurrence of this hitting of a blot gives an adversary a great advantage, and allows him to win the gammon. There are two kinds of victory—winning the hit, and winning the gammon. The party who has played all his men round into his own table, and by fortunate throws of the dice has borne or played the men off the points first, wins the *hit*. The gammon may be explained as follows: When you have got all your men round to your own table, covering every point, and your adversary has a man out, then you are enabled to *bear* or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his man placed by a throw on your table, you win the gammon. If the adversary has been able to bear one before you have borne all your men, it reduces the victory to a hit. Two hits are reckoned equal to one gammon in playing matches. To win two games out of three is called winning the *rub*, as at whist.

Backhuysen, or BAKHUIZEN, LUDOLF, a famous marine painter of the Dutch school, was born at Emden in Hanover, in 1631, and in 1650 was placed as a clerk in Amsterdam. He, however, resolved to devote himself to painting, and with that object received instruction from Everdingen and Dubbels, in a short time attaining extraordinary skill and readiness in execution. His most famous picture is the sea-piece in the Louvre, which he was commissioned to paint by the magistrates of Amsterdam, and which was in 1665 sent as a present to Louis XIV. In all the utmost truthfulness prevails; his colouring is excellent, though somewhat cold; his earlier are preferred to his latest pictures. He etched on copper, and gave lessons in calligraphy. He died in 1708.

Bacolor, a town of the island of Luzon, Philippines, 10 miles NW. from Manila. Pop. 8737.

Bacon, DELIA, American authoress, born 1811, died 1859. She was eminent in her day as a teacher, and wrote several stories, but is now remembered only as an eloquent advocate of the theory that the plays of Shakespeare were written by Lord Bacon. She herself did not originate the idea, but was the first to give it any currency, in her *Philosophy of the Plays of Shakespeare Unfolded* (1857). The book had the honour of a preface from the pen of Nathaniel Hawthorne, and the theory has been accepted by a few persons in both England and America, who, though more noisy than numerous, have wasted not a little ingenious reasoning in its advocacy. In W. N. Wymen's *Bibliography of the Bacon-Shakespeare Controversy* (Cincinnati, 1884), there are no less than 255 entries, of which as many as 73 are books or pamphlets on the wrong side of this question.

Bacon, SIR NICHOLAS, was born in 1509, most likely at Chislehurst, Kent, and passing from the abbey school at Bury to Corpus College, Cambridge, (1523), was ten years later called to the bar. In 1537 he was appointed solicitor to the Court of Augmentations, and in 1539, on the dissolution of the monasteries, he presented to Henry a reasonable project for applying their revenues to the founding of a college for the study of diplomacy. Unfortunately, the king had already dispersed the forfeited estates. Of these the young lawyer received no small share; and in 1546 he was advanced to the office of attorney of the Court of Wards. During Mary's reign his Protestantism cost him all his public honours and emoluments; but on her death in 1558, he received from Elizabeth the post of lord keeper of the Great Seal. Elizabeth left to him and to Cecil the ordering of church matters for the most part; and Parker chiefly owed to him the see of Canterbury. He was always honestly opposed to Catholics generally, above all, to Mary of Scotland. Elizabeth honoured him with several visits—one of six days in 1577, at his magnificent mansion of Goughamery, Hertfordshire. He died at York House, his London residence, 20th February 1579. A profound lawyer, and all but a great orator, Sir Nicholas was one of those solid and stately Englishmen to whose sagacity, high principle, and firm demeanour England owed its safety in that critical period when Elizabeth mounted the throne.

Bacon, FRANCIS, Lord Verulam and Viscount St Albans, born at York House, in the Strand, London, 22d January 1561, is usually, but inaccurately, spoken of as Lord Bacon. He was the younger son of Sir Nicholas Bacon (q.v.) by his second wife Ann, second daughter of Sir Anthony Cooke, Edward VI.'s tutor. Bacon passed his boyhood with his elder brother Anthony under the stern discipline of his mother, a woman of powerful will and a zealous Calvinist. When twelve years old (1573), he, with

Anthony, entered Trinity College, Cambridge, where the brothers remained till Christmas 1575. In June 1576 they began to study law as 'ancients' of Gray's Inn. A year later, Bacon went to Paris in attendance on the ambassador Sir Amias Paulet, but his father's death recalled him in 1579. Little property fell to his share, and he applied himself anew to the law, being called to the bar in 1582, and becoming a bencher of his inn in 1586.

From an early age Bacon exhibited extraordinary intellectual capacity. Queen Elizabeth noticed his precocity when he came to court with his father: at Cambridge the youth recognised the barrenness of scholastic philosophy and the need of educational reform, and soon afterwards became conscious of power in himself to apply to science original methods of study, which should extend man's knowledge of nature beyond any limits yet reached. To fulfil this ambition he resolved to adapt his career. Lucrative employment was necessary to supply him with the means of research, and he was twice injudicious enough (1580 and 1592) to assert openly that he subordinated everything to his 'contemplative ends,' when petitioning the powerful minister Burghley, who had married his mother's sister, for place about the court. Burghley declined to aid him, and to advance his worldly interests Bacon added to his legal practice an independent pursuit of politics. He became member of parliament for Melcombe Regis, 1584, for Taunton in 1586, and for Middelsex in 1593; and sought to attract the queen's attention by addressing to her a paper of advice in 1584, in which, with a boldness unique in a barrister of three-and-twenty, he argued for more tolerance in the treatment of recusants, and by writing in 1589 a statesmanlike pamphlet on the controversies in the Anglican Church, in which he pleaded for elasticity in matters of doctrine and discipline. These efforts were overlooked, and in 1593 he offended the queen by opposing in parliament the grant of a subsidy. Meanwhile, in despair of obtaining any favour from Burghley, Bacon attached himself to the brilliant and impulsive Earl of Essex, Burghley's rival at court, through whom he thought to put into effect some of his political schemes. Essex, who also took Bacon's brother Anthony into his service, strove in vain to obtain for Bacon in 1593 the office first of attorney and then of solicitor-general, and in 1596 that of master of the rolls. Bacon's disappointments were embittered by want of money, and he gladly accepted from Essex a gift of land at Twickenham. To enable Essex to secure a permanent hold on the queen's favour, Bacon recommended him to employ petty tricks of flattery, which were ill adapted to his frank and impulsive character, and Bacon soon found that he had misunderstood his patron. He advised him in 1598 (although he afterwards denied having done so) to undertake the suppression of Tyrone's great rebellion in Ireland, and when the earl returned thence in disgrace (September 1599) and was tried in June, Bacon, at his own request, acted (in a subordinate capacity) as the prosecuting counsel, in the hope, as he said, of aiding his patron. Essex was dismissed from all offices of state, and released in August. Bacon, like his brother Anthony, seemed anxious for his reinstatement in the queen's favour, but when Essex broke into open rebellion in January 1601, Bacon voluntarily endeavoured to secure his conviction on the capital charge of treason; drew up after the execution the official declaration of Essex's treasons; and avowed in another paper for his own conduct, on the ground that the maintenance of the state is superior to private ties of friendship.

In the last years of Elizabeth's reign, Bacon tried,

in and out of parliament, to act the part of mediator between crown and commons, and recommended a tolerant policy in Ireland. On James I.'s accession (1603), Bacon sought royal favour by extravagant professions of loyalty; by planning schemes for the union of England and Scotland, and for pacifying the Church of England on comprehensive lines; and by making speeches in parliament, in which he tried to prove that the claims of the king and parliament could be reconciled without degrading either estate. For these services he was knighted (23d July 1603), and was made a commissioner for the union of Scotland and England. In 1604 he received a pension of £60 a year in consideration (as the patent stated) of James's respect for his brother Anthony, who had died in 1601, after proving himself a staunch champion of the Scottish succession. In 1605 Bacon showed how his leisure had been employed, by publishing the *Advancement of Learning*; and on 10th May 1606 he married Alice Barnham, a London alderman's daughter, of whose personal character nothing is known. His public fortune had now changed. On 25th June 1607 he became solicitor-general, after a delay caused partly by the opposition of Burghley's son and successor, Sir Robert Cecil, and partly by Bacon's unwillingness to serve under Sir Edward Coke, a personal enemy, who was attorney-general till 1607.

In the last session of James's first parliament (February 1611) the differences between crown and commons grew very critical, and Bacon assumed his former rôle of mediator, although he confessed his distrust of James's chief-minister, Cecil (now created Lord Salisbury). At the same time he argued in published tracts that reform could best be assured by a liberal use of the king's prerogative. On Salisbury's death in 1612, Bacon informed the king that he was willing to devote himself exclusively to politics, and offered to manage parliament and to obtain supplies without concealing undignified bargains after Salisbury's discredited methods. He was disappointed of the office of master of the wards at this time, but, on 27th October 1613, was promoted to the attorney-generalship. In the 'Addled Parliament' of 1614 Bacon was still sanguine of effecting what he called his policy *ex gentibus*, according to which the interests of king and people should be made to coincide. A sympathetic atmosphere between the two bodies was to be developed, and mutual concessions were to follow, accurately defined and spontaneously rendered. In October 1615 he pleaded in vain for a new parliament, while re-announcing his sanguine views. By that date Bacon saw that James was as little likely as Essex to adopt his domestic policy, and soon perceived that the bold handling of foreign affairs, which he regarded as essential to the conservation of patriotism, was alien to the nature of a king who delighted in intricate diplomacy. But Bacon craved for personal advancement with increased eagerness, and henceforth he obtained it by suppressing his real opinions, by conventional flattery of all who could serve him, and by systematising petty tricks of conduct in order to circumvent the opposition of those likely to obstruct him.

In 1615 two prosecutions in which he engaged illustrate his servility. In one, Oliver St John was prosecuted for denouncing the illegality of benevolences, and made his submission. In the other, Edmund Peacham, an old Somersetshire clergyman, was charged with having written a sermon, which he had not preached, justifying insurrection under certain circumstances. Torture was applied with Bacon's assent, although not at his suggestion, and Bacon examined the prisoner while undergoing it.

without extracting any information. It was then resolved to prosecute Peacham for treason in the King's Bench, and Bacon undertook to confer separately and privately with each judge of the court, in order to secure a conviction. Three judges yielded to Bacon's advice, but Coke resisted, and at the trial denied that Peacham, who was convicted and died in prison, was guilty of treason. In 1616 Bacon prosecuted Somerset, with whom he was intimate, for the murder of Overbury, and in that and the next year helped to secure Coke's dismissal from the bench, on the grounds, first, that the judge denied the superiority of the Court of Chancery to his own Court of King's Bench, and secondly, that he allowed the king's prerogative to be questioned in an exchequer case.

On 9th June 1616 Bacon became a privy councillor, and on 7th March 1617 Buckingham, whom Bacon had persistently courted, obtained the lord-keepership for him. On 7th January 1618 he became lord chancellor, and on 12th July he was raised to the peerage as Lord Verulam. The title was taken from *Verulamium*, the Latin name of St Albans, near which lay Bacon's estate of Gorhambury. Bacon's obsequiousness was now more marked than ever. He accepted the king's policy of the Spanish marriage, although it was hostile to all his principles, and by exceptional self-abasement averted a quarrel with Buckingham, whose brother's marriage with Coke's daughter Bacon had vindictively opposed. A word from Buckingham influenced his behaviour to suitors in the Court of Chancery, where he worked hard in clearing off arrears. In one case, a Dr Steward complained to Buckingham that Bacon had decided a case against him; Buckingham wrote to Bacon expressing his surprise, whereupon Bacon cancelled his decision, and referred the case anew to arbitrators outside the court. Bacon was on the side of severity in the cases of Raleigh (1618) and of his own friend Sir Henry Vekerton (1619). In 1620 he advised the summoning of a new parliament; on 12th October in that year published his *Noctum Organum*; and on 26th January 1621, was created Viscount St Albans. But his fall was now at hand. The Commons, led by Bacon's enemy Coke, first inquired into a recent increase of monopoly-patents, by which Buckingham had enriched his relatives. Bacon had argued for their legality, and parliament was anxious to call him to account for this opinion, but the king refused to sanction the step. Complaint was then made that Bacon was in the habit of taking bribes from suitors in his court, and on 17th March 1621, charges were sent to the House of Lords by the Commons for inquiry. Bacon fell ill. That he took presents from suitors was undeniable, but that he allowed these gifts to influence his judicial decisions has been disputed with some effect. Nevertheless, the Steward case shows that Bacon was guilty, in one instance at least, of polluting justice. On 20th April, a copy of the accusation was sent him, and a week later he submitted himself to the will of his fellow-peers, without offering any defence. It was ordered that he be fined £40,000, be imprisoned during the king's pleasure, and be banished parliament and the court. In June he was released from the Tower, and retired to his family residence at Gorhambury, near St Albans. In September the king pardoned him, but declined to allow him to return to parliament or the court. Bacon employed himself in literary work, completing his *Henry VII.* and his Latin translation of his *Advancement* (*De Augmentis*). In March 1622 he offered to make a digest of the laws, but no further notice was taken of him in spite of the frequent petitions that he addressed to Buckingham, James I., and James's successor, Charles. In

March 1626 he caught cold while stuffing a fowl with snow near Highgate, in order to observe the effect of cold on the preservation of flesh. He was removed to the neighbouring house of Lord Arundel, where he died on 9th April. He was buried in St Michael's Church, St Albans. He was fond of pomp in his domestic arrangements, and died deep in debt.

Bacon's literary work occupied the greater part of his time throughout his life. It is divisible into philosophical, purely literary, and professional writings. To the first the chief importance is to be attached. Bacon's philosophy is to be studied in (1) *The Advancement of Learning* (1605), a review in English of the state of knowledge in his own time, and its chief defects; (2) *De Augmentis Scientiarum* (1623), a Latin expansion of *The Advancement*; and (3) *Noctum Organum, or Indications respecting the Interpretations of Nature* (1620), which was intended to form the second book of a never-completed greater treatise, *Instauratio Magna*, a review and encyclopædia of all knowledge. To the *Noctum Organum*, preliminary drafts of which are to be found in a number of detached pieces, *Cogitata et Visa*, *Temporis Partus Masculus*, &c., was prefixed a *Prostantio Operis*, a plan of the greater work; and in *Historia Ventorum* (1622), *Historia Vitæ et Mortis* (1623), *Historia Densæ et Rari* (1628), and *Sylva Sylvarum* (collection of collections, 1627), materials chiefly consisting of digested facts of natural history, for other portions of the *Instauratio*, are extant.

Bacon's system for interpreting Nature which was to lay the foundations of the natural sciences is exhibited in all these works. He first abandons the deductive logic Aristotle and the schoolmen, in which pre-ceived theories were constructed without access to actual fact, and were syllogistica arranged to lead to elaborate conclusions. He tested by observation and experiment. Bacon relied on inductive methods on the accumulation and systematic analysis of isolated facts to be obtained by observation and experiment. From this assemblage of facts alone were any conclusions to be drawn. The induction was to rest not on a simple enumeration of phenomena, a method familiar to predecessors of Bacon, but on their careful selection and arrangement, with necessary rejections and eliminations. 'Phantoms of the human mind'—'idols' (*idola*) of the tribe, the cave, the market place, and the theatre, as Bacon called them—imprinted by man, or produced by his environment, were exposed and swept aside. Nothing was to obscure the 'dry light of reason.' Bacon took all knowledge for his province, and his inductive system was to arrive at the causes not only of natural but of all moral and political effects. While developing his new scientific method, Bacon made some shrewd scientific observations. He described heat as a mode of motion, and light as requiring time for transmission, but he was behind the scientific knowledge of his time; knew nothing of Harvey's discovery of the circulation of the blood, or of Kepler's calculations, and rejected the Copernican system of astronomy. His system was never finished. He never reached his examination of metaphysics of final causes which was to succeed his treatment of physics.

His greatness consists in his repeated insistence on the facts that man is the servant and interpreter of Nature, that truth is not derived from authority, and that knowledge is the fruit of experience. The impetus which his inductive methods gave to future scientific investigation is indisputable. As he himself described it, he 'rang the bell which called the other wits together.' He was the practical creator of scientific induction, and although

succeeding scientific experimentalists may have been unconscious of their indebtedness to him, their chief results are due to their adoption of his logical method. An attempt has been made to credit Bacon with the parentage of the English philosophy of Hobbes, Locke, and Hume. That Bacon, like these philosophers, was an empiricist or realist is obvious; but that his philosophy was systematic enough to originate a school of thought, in the same sense that Descartes and Hegel founded a philosophic school, is untrue.

As a writer of English prose and a student of human nature, Bacon is seen to best advantage in his Essays, ten of which were first published in 1597; after passing through new editions in 1598, 1604, 1606, and 1612, they reached the final number of 58 in 1625. Full of practical wisdom and keen observation of life, written in concise language of extraordinary pith and dignity, they illustrate the worldly shrewdness of their author, as well as his quickness and accuracy of perception. His *History of Henry VII.* (1622) shows scholarly research, besides a direct and nervous style. In his fanciful *New Atlantis*, Bacon suggests the formation of scientific academies—a suggestion to which the foundation of the Royal Society has been traced. Bacon's *Apophthegms* (1625) are a disappointing collection of witticisms. His religious works included prayers and a verse translation of the Psalms (1625), which display a personal piety difficult to reconcile with his conduct. Bacon's professional works embrace *Martins of the Law* (1630), *Reading on the Statute of Uses* (1612), pleadings in law cases, and speeches in parliament. Dr Rowley, Bacon's chaplain in 1638, and Isaac Gruter in 1653, at Amsterdam, issued imperfect collected editions of Bacon's works. Others followed in 1730 (by Blackburn), and in 1825-36 (by Basil Montagu). The last was superseded only when Spedding, Ellis, and Heath produced their complete collection (14 vols. 1857-74), seven volumes of which were devoted to the apologetic *Life and Letters* by Mr James Spedding, that great storehouse for Bacon's biography. The fullest description of the Baconian system is given in Kuno Fischer's *Francis Bacon von Verulam* (Leip. 1856; Eng. trans. 1857). Professor Fowler's edition of the *Norram Organum* (Oxford, 1878) is also useful. Macaulay's brilliant attack on Bacon's character, and eulogy of his philosophy (first issued in *Edinburgh Review*, July 1837), lack sobriety in both sections. Mr S. R. Gardiner's account of Bacon in his *History* and in the *Dictionary of National Biography*, where Bacon is represented as a far-seeing politician, Dean Church's monograph in the *Men of Letters Series* (1884), and Dr Abbott's *Life* (1885), form valuable commentaries on Spedding's conclusions.

'For my name and memory,' Bacon wrote in his will, 'I leave it to men's charitable speeches and to foreign nations and the next ages.' An unparalleled belief in himself, which justified to himself his ignoring of all ordinary laws of morality, is the leading feature in his character. He was taught by the example of the Machiavellian politician, who were his father's friends, to disregard elementary notions of right and wrong; in early youth he was conscious from the first of the possession of intellectual power which, if properly applied, could revolutionise man's relations with nature, and as a consequence, he recognised no justice in any moral obstacle which might prevent his attainment of such material wealth and position as would enable him to realise his intellectual ambition. Neither Macaulay's mingled contempt and admiration, nor Pope's popular epigram in his *Essay on Man* (iv. 281-2)

If parts allure thee, think how Bacon shined;
The wisest, brightest, meanest of mankind—

is an adequate summary of his character. Bacon found it necessary to turn much of his attention to politics in his attempt to gain worldly power, and showed there some of his mental capacity. But he was never absorbed in politics, and always regarded himself (as he phrased it) in great part a stranger in the political sphere; his political principles were not large enough or definite enough to enable him to play a commanding part in the constitutional crisis. He did not make sufficient allowance at any time for the natural dispositions and abilities of the men with whom he worked. He drew up practical rules and sketched out elaborate tricks for the conduct of those who, like himself, were the architects of their own fortunes. But he failed entirely as a manager of men. It is only in scientific and literary work that he was great; but there very few have proved greater.

Bacon, JOHN, sculptor, was born in London, November 21, 1740, and, trained as a modeller and painter on porcelain, in 1769 he received the first gold medal for sculpture awarded by the Royal Academy, of which next year he was made an associate, in recognition of the high merit of his statue of Mars. Among his principal works are the monuments to Lord Chatham in Westminster Abbey and the Guildhall, to Howard and Johnson in St Paul's, and to Blackstone at All Souls' College, Oxford. Bacon's success aroused great jealousy, and his rivals claimed that he was deficient in imagination, and had no refined perception of beauty; but some of his emblematical figures display perfect classical taste. He died 4th August 1799.

Bacon, ROGER, a monkish philosopher of the 13th century, who, through the force of his intellect, raised himself far above his age, made wonderful discoveries in several sciences, and contributed much to extend the then scanty knowledge of nature. Belonging to a well-to-do family, he was born at Ilchester, Somersetshire, about the year 1214. He studied at Oxford, where he seems to have been in orders in 1233, and then proceeded to Paris. About 1250 he returned to Oxford, and may then have entered the order of the Franciscans. Physics seems to have been at that time the chief object of his labours; and liberal friends of science supplied him with the means of pursuing his researches. In exploring the secrets of nature, he made discoveries and invented applications which were looked upon by the ignorant as the work of magic. This prejudice was encouraged by the jealousy and hate with which his brother monks regarded his superiority. About 1257 he was imprisoned at Paris, forbidden all human intercourse, and even all opportunity of writing. Among the few clear-sighted men who admired Bacon's genius and pitied his misfortunes, was Guy de Foulques, sometime papal legate in England. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On Guy's ascent, however, of the papal throne as Clement IV. in 1265, Bacon wrote to him expressing his readiness to furnish him with whatever he desired, and Clement in reply repeated the request to see his works. Bacon accordingly drew up his *Opus Majus*, which he sent, along with two other works, it is said, to the pope, by his favourite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through a diligent study of the languages and of nature. How Clement received them is not very well known; but they could only have reached him about the time he was seized with his last illness in 1268. The year before, Bacon had regained at least comparative freedom; but in 1278 the general of the Franciscan order, Jerome of Ascoli, declared

himself against Bacon, forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by Pope Nicholas III. This new imprisonment lasted ten years. When in 1288 Jerome himself became pope, under the name of Nicholas IV., Bacon sent him a treatise on the means of warding off the infirmities of old age, with a view to convince him of the harmlessness and utility of his labours, but in vain. He seems to have at last recovered his freedom about 1292, and two years later to have died at Oxford. A true forerunner of his greater namesake, Bacon in spite of his extraordinary genius could not rid himself of all the prejudices of his time. He believed in the philosopher's stone and in astrology. His chief invention is the magnifying-glass. There are also in his writings other new and ingenious views on optics—for example, on refraction, on the apparent magnitude of objects, on the great increase in the size of the sun and moon in the horizon. On other subjects, again, he fell into the greatest errors. He made several chemical discoveries which were wonders at that time. He knew, for instance, that with sulphur, saltpetre, and charcoal, we may produce explosions. Mathematics applied to observation he considered to be the only means of arriving at a knowledge of nature. He studied several languages, and wrote Latin with great elegance and clearness. Deserving of honourable mention are his discoveries of the errors that prevailed in the calendar, and his proposals and data for remedying them, in which he came very near the truth. He prepared a rectified calendar, of which a copy is preserved in the Oxford library. On account of his extensive knowledge, he received the name of 'Doctor admirabilis.' Six of his works had been printed between 1485 and 1614, when, in 1733, S. Jobb edited the *Opus Majus*. Professor Brewer edited the *Opus Tertium*, *Opus Minus*, and *Compendium Philosophicum* in 1859, under the title of *Opera Inedita*, with a valuable preface. See also E. Charles, *Bacon, sa Vie, ses Ouvrages, ses Doctrines* (1861); the German works of Siebert (1861), Schneider (1873), Werner (1879), and Held (1881); and, for the popular conception of Bacon as 'Friar Bungay,' Wards *Old English Drama* (1878).

Bacon, the back and sides of a pig, *cured* or preserved for eating by salting and drying. The mode of curing will be described under **HAMS**; and their properties as articles of food, under **PORK**. The word has come into English through the medium of French, from an old Teutonic root (seen in old Dutch *baken*, 'bake'), from which also is descended the word *back*.

Bacon Beetle. See **DERMESTES**.

Bacsanyi, JÁNOS, a Hungarian poet, was born May 11, 1763, at Tapolca. His first work, published in 1785, procured him an appointment in a public office, but a liberal poem cost him this in 1793, as well as his liberty the year after. In 1796 he came to Vienna, and here he married a few years later the German poetess, Gabrielle Baumgarten—an unhappy match. In 1809, Bacsanyi translated Napoleon's proclamation to the Hungarians, and was afterwards obliged to take refuge in Paris. After the peace of Paris, he lived at Linz, and there he died, May 12, 1845. His collected poems appeared at Pesth in 1827.

Bács-Bodrog, a county in the south of Hungary, between the Danube and the Theiss. Area, 4260 sq. m.; pop. (1881) 38,063. The land is low and marshy, and very unhealthy, but of great fertility. It produces the best wheat; and wine, tobacco, and cattle are also exported. The capital is Zombor (q.v.). Bács is a village of 3000 inhabitants.

Bacteria (plural of late Lat. *bacterium*, Gr. *baktērion*, dimin. of *baktērōn*, 'stick,' 'staff'). It is a familiar fact that if water which contains or has contained organic matter either of animal or vegetable origin be left to itself, it soon becomes cloudy and covered with a film. If the floating flakes or surface scum be examined with the high power of a microscope, a marvellous exhibition of the lowest forms of life is presented. Representatives of the simplest animals, such as Infusorians, will probably be seen, and in some cases also some of the lowest single-celled plants, but all these will appear as giants amid a crowd of dwarf organisms, most of which are Bacteria. These usually appear as minute spheres, rods, or threads, propelled along by delicate lashes, or quivering together with the usual tremulousness of very small floating particles, or lying more passively entangled in a jelly-like flake. In a short time it will be seen that these bacteria multiply with extraordinary rapidity by cross division; one soon becomes a thousand, and the minute specks which first appear may, if the water contains enough food, soon form a mass filling the vessel. Wherever organic matter is in process of decomposition, in infusions as above indicated, or in disease or death, or within the living and healthy organism, there these bacteria are to be found.

So abundant are they, that in spite of their minuteness they did not escape the enthusiastic observation of the early workers with the microscope. Thus, in the 17th century, and with the comparatively imperfect microscope of those days, Leewenhoek described some of these low organisms. In 1773 O. F. Müller established two genera, *Monas* and *Vibrio*. Not much progress was made, however, till about 1838, when Ehrenberg and Dufardin included bacteria in their investigation of minute organisms. They referred the forms which they described to the animal series among Infusorians, and united a large number under the general title *Vibrionia*. Nor was this reference surprising. At that time naturalists had hardly begun to realise that animals had no monopoly of mobility, though it is now a commonplace observation that the simplest plants exhibit a power of locomotion which is almost wholly lost in the higher forms. The argument in favour of the animal nature of bacteria which was once furnished by their movements is thus no longer specially cogent. That was not all, however. It is well known that the vast majority of plants have a characteristic way of feeding, deriving their carbon from the carbonic acid gas mixed with the air or water, and their other food-products from inorganic substances in aqueous solution. They take up the matter necessary for nutrition in a much simpler form than is possible for animals. This they are able to do as regards the carbon through their possessing the power of making a green colouring matter known as chlorophyll, by the aid of which the carbonic anhydride is absorbed and split up in sunlight. Animals, on the other hand, are only able to utilise food-products which have already been lifted up to a comparatively high level, which have in fact been worked up by plants or by other animals into complex compounds known as albuminoids—fats, starch, sugar, and the like. They cannot directly feed on the carbonic anhydride of the surrounding medium, nor on inorganic substances in solution in water. An appreciation of this physiological difference between plants and animals led to some difficulty in regard to the position of forms like bacteria. For in the first place they have no chlorophyll wherewith to utilise carbon at the low level of carbonic acid gas, and in the second place the nature of their occurrence

plainly shows that they feed on the products of decomposition of plants or animals—physiologically speaking, very much as animals do. But as the forms and life-history of the simplest organisms were gradually elucidated, it became evident that such physiological distinctions were not only not hard and fast, but were delusive as a basis of classification. It was seen that though bacteria and other lowly organisms now known as simple fungi did not feed as the majority of plants do, yet they were in structure and development so entirely like unmistakable vegetables—the simple Algae—that separation was impossible. To Cohn (1853) is due the merit of having established, on grounds of structure and life-history (morphology and development), the fact that bacteria are plants, and all succeeding research has confirmed his conclusion, which Nageli (1857) corrected in detail, however, by referring the bacteria or Schizomycetes not to Algae, but to the parallel class of Fungi.

The bacteria or schizomycetes may thus be defined as extremely small, single-celled fungoid plants without chlorophyll, remaining single or united in loose colonies, reproducing rapidly by cross division or by the formation of spores, often occurring in myriad crowds enveloped in a jelly like secretion, or separately with the power of energetic movement, and almost always associated with the decomposition of albuminoid substances.

Terminology.—The term micro-organism is convenient as a general word, especially when the position of the form in question is still undetermined. The French word *microbe*, introduced by Sédillot in 1878, has been approved by Lillré, and is very widely used. It means a small living organism, and was invented to avoid dispute as to the plant or animal nature of low organisms like bacteria. It is now virtually equivalent to the latter. Bacterium is, like bacillus, properly the name of a distinct genus of schizomycetes, but the generic titles have both been too indiscriminately bestowed to be of much use, and are better restricted to popular designation. The term bacteria will be used throughout this article as equivalent to the technical title schizomycetes.

The physiological significance of bacteria in relation to disease and fermentation will be the special subject of the article GERM THEORY. The present article has to do with the following points only—(1) distribution; (2) form and structure; (3) life history; (4) general classification; (5) more important forms; and (6) the methods of research. For further details as to position and classification, see SCHIZOMYCETES.

1. **Distribution.**—Bacteria are found practically everywhere—in air, water, and soil; in the mouths of men as well as on the walls of their houses; on the hair of the head and the toes of the feet; in chalk and coal; in food and drink; but especially where there is disease, death, or decomposition. To speak of the 'omnipresent bacillus' is hardly an exaggeration.

(a) **Air.**—In the observatory of Montsouris, in Paris, M. Miquel has charge of a special laboratory for investigating the times and seasons of atmospheric germs. In Britain also, some attention has recently been directed to the prevalence of micro-organisms in the air of various regions—lodging-houses, school rooms, sewers, &c. In cubic metre of Montsouris air there are on an average eighty bacteria. The maximum abundance is in autumn, the minimum in winter. The number rises in drought, and is reduced by heavy rainfall. Winds from crowded quarters, hospitals, slaughter-houses, &c., float a large number of microbes to the observatory, but pure air from lofty regions was found to contain hardly any. Sunlight is probably the most effective antagonist of these subtle enemies.

Some bacteria can only live in presence of atmospheric oxygen, and these are termed by Pasteur aerobic; others derive their oxygen from the organisms or decomposing media in which they live, and these are known as anaerobic.

(b) **Water.**—Even pure water contains many bacteria, and always more than occur in air. The minimum occurs in condensed water-vapour (900 to the litre), the maximum (80 millions per litre, 1½ pint) of course in sewer water, especially if there be the least stagnation. If there be a proper flow of water, however, the germs never become dry enough to be floated in the air, and are not therefore dangerous. The sulphureous springs of the Pyrenees contain an abundant bacterium (*Beeggiatoa*), which accumulates sulphur in its cell, and is especially abundant in the floating scum known as glairine or bargeine (see BARGEINE). Some bacteria, often called chromogenic (or colour-making) on account of their bright pigment, occur in water under certain conditions, and have given rise to superstitious accounts of 'blood-rain.' The red colour of stagnant pools in autumn has been known for fifty years as the result of a micro-organism, described by Ehrenberg as *Ophidomonas sanguinea*, but now known as a species of *Spirillum*. It rapidly changes from green to red, and if a waterspout draw up and re-discharge the bacterium-laden water, a shower of 'blood-rain' is no longer mysterious. Snow is sometimes coloured in a varied way by the presence of a similar organism (*Micrococcus*); which is not, however, to be confounded with the much larger *Protococcus* of 'red snow.'

(c) **Soil.** Nor is soil free from bacteria. Spring-water fresh from the source carries a cargo of these micro-organisms. Pasteur found that the germ of splenic fever (*Bacillus anthracis*) occurred in great abundance in the earth round about the pits in which diseased cattle had been buried. He also found bacteria in the earthy excrement of worms. Some refer the origin of most epidemic diseases to the ascent of these deadly germs from the soil, and if this be in any way true, the danger of drying marshes, of narrowed river beds, and of dust generally, is obvious enough. Some striking researches by M. Bechamp go to show that bacteria may be dominant in soil for an incalculable period. A fresh piece of chalk taken from the quarry, with due care to exclude extrinsic germs, gave rise to abundant bacteria. He also discovered their presence in coal, but was unable to bring the sleeping germs into life again. Micro-organisms of modern date have also been found abundantly by M. Parize in the bricks of walls, and others have been found in association with the formation of saltpetre in the soil.

(d) **Food, &c.**—The rancidity of butter, the putrefaction of cheese, the game flavour and high odour of meat, the yellowness and blueness of milk kept in imperfectly sealed vessels, the excessive staleness of bread, and a crowd of other unhealthy conditions in food, are largely due to the presence of bacteria. Bloody stains on bread, meat, paste, &c., have also been traced to the presence of a brightly coloured micrococcus. In the same way the bitterness, ropiness, &c. of bad wine are due to the same organisms.

(e) **Decomposition and Disease.**—A large number of bacteria are known to occur in direct association with pathological processes of decomposition in plants and animals, without apparently having any direct connection with the decomposition. These are Saprophytes (q.v.), like fungi generally. Others, however, have been proved in many cases to be the causes of pathological conditions in men and animals, a profound fact fundamental to the Germ Theory (q.v.) of disease. In contrast to the sapro-

phytic bacteria, these are conveniently described as pathogenic. It must not be supposed, however, that the presence of a bacterium in an organism is necessarily associated with abnormal decomposition or with disease, since some occur quite normally, and without any evil influence.

II. Form and Structure.—As regards the shape of the individual units, four principal forms may be distinguished—viz. spherical, elliptical, rod-like,



Fig. 1.—Different Forms of Bacteria (after Zopf):

a, Micrococcus; *b*, Micrococcus; *c*, Bacterium; *d*, Bacillus; *e*, Clotidium; *f*, *g*, *h*, *i*, ciliated phases; *k*, Spirillum; *l*, Leptothrix; *m*, Spirillum.

and spirally curved. It must be noted, however, that a bacterium may, as Lister and others have shown, pass from one form to another in response to different physiological conditions, that a species spherical in its young stages may be elliptical or cylindrical afterwards, or that a rod-like form, such as *Bacterium lactis*, which causes lactic acid fermentation, may become thread-like or spiral when sown in urine.

Bacteria do not, however, remain single, but reproduce by division, and the results of division may remain loosely united. (1) The spherical micrococcus and the elliptical or cylindrical bacterium always divide in one direction, and the resulting couple may remain temporarily united, or continue multiplying to form a myriad colony embedded in a jelly (zoogloea). (2) In Bacillus, Leptothrix, and Beggiatoa, the cells may form long cylindrical threads, and this is varied in Vibrio, Spirillum, and Spirochete by the development of spiral or wavy curvature. (3) In Sarcina, again, the division takes place in three planes, and the result is obviously the formation, not of long chains, but of cubical clumps. Just as among simple



Fig. 2.—Multiplication of Bacteria (after Zopf):

a, *b*, *c*, division of Cocci (Crenothrix); *d*, round zoogloea of the same; *e*, oval zoogloea of Beggiatoa; *f*, cubical packets of Sarcina; *g*, ramified zoogloea of Cladotrix.

algae, so here the results of division form—(1) isolated spheres; (2) longitudinal or even branching filaments; and (3) planar expansions, always, however, extremely minute.

Structure.—The unit mass of protoplasm which forms the bacterium individual is always inclosed in a membrane, which sometimes consists of the cellulose characteristic of the cell-walls of plants, but more frequently of a peculiar albuminoid substance which has been designated mycoprotein. This membrane may be stiff or flexible, colourless or brightly pigmented, and undergoes uniform increase in thickness. The contained protoplasm

consists largely of the above-mentioned mycoprotein, and may include fat-like granules, particles of pure sulphur, grains of starchy material, and dissolved pigment often of a brilliant colour. No nucleus has yet been detected. In all bacteria, except those which form long filaments, locomotor organs are present at some stage or other, as delicate lashes or cilia always situated terminally. These have been oftenest observed in the young swarm spores, and 1-4 may be present. In the adult forms they apparently arise when the protoplasm is needing oxygen, like the long tongues in a dying flame, and they serve to hurry the bacterium to the surface or to some position where oxygen is more abundant.

III. Life history.—It is convenient to distinguish in the life-history three important events or processes—(a) increase in size and modification of form; (b) reproduction; (c) the assumption of the resting form known as zoogloea.

(a) *Increase in Size and Modification of Form.*—As the result of abundant nutrition, the bacterium unit increases in size, and this growth necessitates division, and is associated with change of form. The minute spherical cocci usually grow into rod-like or cylindrical shapes, and these little rods divide rapidly, ranging themselves in rows to form filaments. In those filaments the original distinctness of the component units is often lost. Nutritive and other conditions, however, affect the form, both of the separate rods and of the composite filaments. Both exhibit a tendency to be more or less spirally curved. Thus wavy forms arise from the straight, and their history shows that the longer forms arising from rows of straight rods are really multicellular, whether they appear to be so or not. This modification of form is technically known as the pleomorphism of bacteria. The various forms—filamentous, incipiently branched, and plane which are exhibited as the results of multiplication, have been already referred to. One other fact must be noticed, that the composite chain of bacterium units never remains perfectly uniform throughout. The parts of the chain are not all in exactly the same physiological conditions, and variations therefore occur abundantly. The end of the thread may become much enlarged, or here and there individual masses may preponderate in size over their neighbours. These variations offer interesting parallels to those occurring in filamentous algae.

(b) *Reproduction.* The more complete the degree of parasitism in fungi, the more probable is the absence of sexuality. In bacteria, the multiplication is an entirely asexual process. The absence of anything of the nature of sexual union may perhaps in part explain the infinitesimal minuteness of the individuals; and again, since the bacteria live to a certain extent bathed in waste products, the stimulating character of the medium has been regarded as a physiological substitute for the stimulus to division usually supplied by fertilisation. The process of multiplication which invariably occurs is by means of division. The coccus or rod-like form becomes somewhat elongated, a double partition wall is developed in the middle, and the two daughter cells are thus formed. If the results remain united, and if the lines of division be all in the same direction, the filaments above mentioned must arise. The resulting forms recall species of Nostoc and other Algæ. When the division occurs in more than one plane, the result is the formation of plates as in *Bacterium merismopedicetes*, or of packets as in *Sarcina ventriculi*, or of discs as in *Crenothrix*.

Besides this external and successive fission, another process is frequently observed in which the divisions occur in a less definite way. Spiral or

other forms are seen to divide rapidly into fragments, either at once externally, or at first only internally. The rupture of the flexible filament occurs in the more passive middle portion, and each half again splits, and so on. The liberated fragments grow again to the adult size.

But in addition to these entirely vegetative processes, bacteria also reproduce by means of special cells—the spores. The contents of the units contract, become rounded off, and surrounded by a

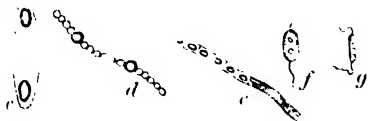


Fig. 3.—Formation of Spores (after Zopf):

a, b, c, *Clostridium*, spore at free end, or at both ends; d, spores forming at certain points in chain, e.g. *Leuconostoc*; e, *Bacillus anthracis*, spores in one stretch of the filament; f, g, ciliated swarm spores.

membrane. It is a special case of internal (endogenous) division, and has been observed in cocci, rods, and spiral forms. In some cases, such as *Clostridium butyricum*, of butyric acid fermentation, the cells which will give rise to spores can be distinguished from the others before the spores have begun to appear. Spore-formation appears to set in as a response to insufficient nutrition, as is the case in very many instances of reproductive activity. The liberated spores germinate and develop into the adult forms. Often ciliated in their young stages, they become more quiescent with increasing size.

(c) *Formation of Zoogloea*.—Wherever bacteria have been allowed to flourish unmolested, jelly-like flakes or clumps are found. These were formerly regarded as distinct forms and called zoogloea, but they are now recognised as a phase in the life-history. Such gelatinous clumps are often conspicuous both in size and colour; thus that of *Clostridium polymyxa* may measure more than an inch across, while the 'frog-spawn' zoogloea occurring not infrequently in the beetroot juice used in sugar manufacture, may attain a size of more than a foot. These zoogloea consist of myriad colonies of bacteria embedded in a jelly. Their formation is due on the one hand to the aggregation of resting bacteria, arising from one mother cell or from several, and on the other hand to the thickening and gelatinisation of the individual membranes. The same habit of aggregation is not uncommonly exhibited by simple unicellular organisms, and also by the cells of higher animals, though in these cases the individual units fuse more or less completely to form a composite mass or plasmodium. Nor is the gelatinous degeneration of the membrane in any way unique, but is exhibited both by algae and fungi.

IV. *Classification*.—A thorough classification of bacteria has yet to be elaborated. The multitude of forms differing in comparatively trivial points of structure, the insufficient state of our knowledge of the life-history of many genera, the difficulties involved by the abundant pleomorphism, the existence of weighty physiological differences between forms which seem otherwise absolutely alike, make a dogmatic classification at present quite impossible. In 1838 Ehrenberg distinguished four genera—(1) *Bacterium*—straight and rigid; (2) *Vibrio*—snake-like and flexible; (3) *Spirillum*—spiral and rigid; (4) *Spirorchete*—spiral and flexible; while Dujardin united the two last into one genus. In 1872 Cohn, to whom so much progress in bacteriology has been due, distinguished four dis-

tinct tribes—(1) Sphaerobacteria—globules (*Micrococcus*); (2) Microbacteria—short rods (*Bacterium*); (3) Desmobacteria—long rods (*Bacillus* and *Vibrio*); Spirobacteria—spirals (*Spirorchete* and *Spirillum*). This classification held ground for a few years, but has been abandoned for a reason which must already be obvious. In 1873 Lister was the first to hint at the fact of pleomorphism. He showed that certain forms referred to different genera and groups were really phases in one and the same life-cycle. The mistake had been made of separating young and adult stages, and of regarding as permanent and fundamental shapes and habits which were only temporary and transitional. Till the life-history of all the forms is completely known, the same mistake in this, as in other departments, is sure in some degree to persist. What Lister suggested was in the same way even more conclusively demonstrated by Lankester. Forms belonging to different groups of Cohn's

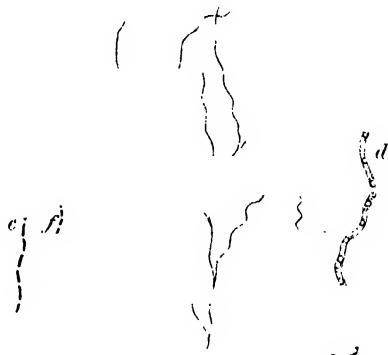


Fig. 4.—Different Phases of one Form—*Clostridium dichotomum* (after Zopf):

a, branched form; b, one twig of the same; c, a small portion of a twig; d, this breaking up; e, f, progressive division into little rods, and then into cocci.

classification were shown to be successive chapters in the life-history of one species. The researches of Billroth (1874), Klebs (1875), Nigeli (1877), Warming, and others, but most of all, perhaps, of Zopf, have established the prevalence of pleomorphism, and have made this fact at least certain, that whatever the final classification is to be, it must be one which takes account, not of specific facts of form, but of the whole round of the life-history, and of the sum-total of morphological and physiological properties. Any classification especially of lowly organisms, where the range of differentiation is always comparatively slight, ought to take account particularly of the two planes of development—vegetative and reproductive (see ALGÆ). But as we have seen, the range of vegetative modification is very limited in bacteria, and the same is true of what of the reproductive processes is now known. De Bary has, however, suggested the distinction of two great groups—those which form spores (endospores), and those which become divided into segments which are equivalent to spores, but are not internally formed (arthrospores). With further knowledge of the reproductive processes, the classification will be gradually elaborated. Two other points must not be overlooked. Recent studies on fungi and algae, which differ so markedly in the respective absence and presence of chlorophyll, tend increasingly to emphasise the close correspondence in structure and life-history between different groups in these two classes of plants. Instead of there being two separate

branches in the genealogical tree, one representing fungoid, and the other algoid forms, it has been repeatedly suggested that the various subdivisions of the fungi are to be regarded as the chlorophyll-less representatives of parallel subdivisions among algae. This must be kept in view in regard to bacteria. Before proceeding to note the most familiar classification and some of the more interesting forms, it must be again observed that a few of the generic titles have come to be used in very vague and ambiguous ways. This is so conspicuous in regard to the terms *Bacterium* and *Vibrio*, which have been used so widely that some authorities incline almost altogether to suppress them as accurate generic designations. The provisional classification now most commonly adopted is that of Zopf, as expressed in the following table. He distinguishes four groups: (1) *Coccacea*; (2) *Bacteriacea*; (3) *Leptotrichae*; (4) *Chalotrichae*.

(1) *Coccacea*.—Only cocci, singly or in contact. Division in one or more directions.

(2) *Bacteriacea*.—Mostly with cocci, and also rods (straight or bent), and thread-forms (straight or spiral), without distinction between base and apex. Division in one direction.

(3) *Leptotrichae*.—Cocci, rods, and thread-forms (straight or spiral), with distinction between base and apex.

(4) *Chalotrichae*.—Cocci, rods, threads, and spirals. Thread forms with false branches.

V. *Important Focus*.—(1) *Coccacea*. Streptococcus is a genus with numerous species, some associated with disease in men and animals, e.g. with diphtheria, yellow-fever, foot-and-mouth disease—others merely feeding on the results of pathological processes, and a few entirely unassociated with diseases of animal life. Cubes or packets of *Sarcina* are found forming coloured patches in various situations. Micrococcus has been observed in cases of scarlatina, measles, whooping-cough, typhus, &c., but their precise rôle is not certainly determined. Hydrophobia is believed by many to be due to the presence of a micro-organism, and micrococcus has been observed in this connection.

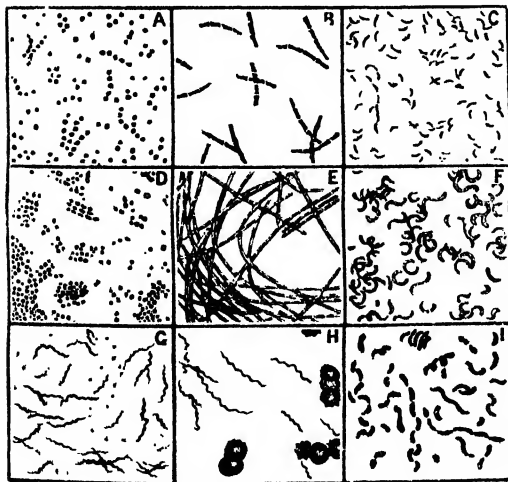


Fig. 5.—Different kinds of Bacteria (mostly after Koch):

A, Micrococci, in drinking-water; B, in spleen fever; C, in cholera (Koch); D, from surface of water; E, in spleen fever (in thread-form, and with ineffectual spores); F, *Spirillum*, from putrefaction; G, *Spirochete*, from the teeth; H, in relapsing fever, from blood; I, different forms of cholera microbe (Koch).

The researches of M. Pasteur have thrown light on this problem. Many micrococci are apparently

simply saprophytic, following and not causing pathological processes. *M. amylicorvus* has been described as the cause of 'fire-blight' on pear-trees and other plants. Many of these forms are brightly coloured, as, for instance, that species which causes the blood-red sweat in the human armpit and elsewhere.

(2) *Bacteriacea*. Species of bacterium have been found associated with pneumonic disease, diphtheria, &c.; others cause fowl-cholera, pebrine of silkworms, and other diseases of animals; and a large number have been described apart from any directly pathological connection. *Bacterium prodigiosum* forms blood-red zoogloea, and occurs on bread, paste, milk, and such commodities. Its appearance has given rise to superstitious anecdotes about 'blood-rain,' and the like. In 1843 this fungus was so prevalent in Paris that it caused a sort of bread-plague, especially in the military bakehouses. *B. aceti* oxidises the alcohol of wine and other fruit-juices into vinegar. *B. ternae*, which is so often described as an almost omnipresent organism, is apparently only a phase in the life-history of many different forms. A species of *Spirillum* is believed to be the cause of relapsing fever, and Koch has described another form—the *Comma bacillus*—which he has found associated with Asiatic cholera. A large number of species are known apart from disease. The frog spawn fungus, otherwise known as *Leuconostoc mesenteroides*, is of some importance, since it sometimes invades and corrupts the beet-root juice and molasses used in sugar manufacture. *Bacillus* is a large genus with numerous formidable species associated with the diseases of men and animals. Such are the bacillus of leprosy, syphilis, and typhoid fever, tuberculosis, splenic fever, glanders, swine fever, &c. The bacillus of 'blue milk,' of hay infusion, and *Bacillus septicus* of putrid albuminous fluids, may be noted as examples of forms unassociated with disease. A species of *Clostridium* is the cause of the disease of cattle known as 'black leg' or 'quarter-evil.'

(3) *Leptotrichae*. A species of *Crenothrix* with long filaments is sometimes abundant enough to stop up narrow water-pipes. *Beggiatoa* occurs in various forms in sulphur springs, on sea-water, on the surface of marshes, &c. The best-known species has a peach blossom red colour. *Leptothrix buccalis* occurs abundantly in the mouth, and is apparently associated with the decay of teeth.

(4) *Chalotrichae*. As a representative of this last group of bacteria, *Chalothrix dichotoma* must be noted, a form with false branches, occurring more abundantly than any other in water containing organic matter.

VI. *Methods of Research*.—Besides the usual apparatus of any well-equipped laboratory for the study of minute structures and organisms, a number of special appliances are required for the successful investigation of bacteria. Thus, since the intrusion of germs other than those which are the specific object of research is a constant danger, there must be some means for sterilising the tubes, tools, media, &c. This is generally done by means of a steam or hot-air steriliser, in which all the extrinsic germs are killed off. Incubators are also used for purposes of cultivation. The bacteria obtained in endless ways may be examined as they are, or stained with reagents to bring out the individual structure, or since the life-history is all important, left to grow, and watched at their successive stages. They used to be left in some sterilised fluid, such as broth, blood serum, urine, milk, or Pasteur's fluid, and allowed to grow in test-tubes, or other vessels, plugged with cotton-wool. It is, however, exceedingly difficult to get a perfectly pure fluid medium, nor was it possible in such cases to isolate

the different kinds of bacterium which might be present. In view of this, Koch has recently introduced the method of cultivation on sterile solid media. Sterile nutrient gelatine, or some such substance, is liquefied in a tube and inoculated with the bacteria in question. These are distributed through the fluid, which is then poured out on a plate of glass and left to solidify. The various bacteria can no longer move about and mingle with one another, but are fixed to one spot, where they develop. The resulting fixed colonies can thus be studied without confusion. Slices of sterilised potatoes are also very frequently used as solid media for the cultivation of bacteria. Finally to elucidate the relation of a micro-organism to a given disease, it is necessary not only to have obtained it from an organism suffering from the said disease, but it is imperative that some of a pure cultivation be introduced into a healthy organism, to see whether it does or does not cause the disease. The inoculation may be brought about by inhalation, or along with the food, or by injection in some form or other.

How such methods have, in the hands of investigators like Pasteur and Koch, resulted in discoveries of profound importance, not only to a scientific theory, but to the practical amelioration of life, will be discussed in other articles.

See ALGÆ, ANTISEPTICS, FERMENTATION, FUNGI, GERM THEORY, INFECTION, SCHIZOMYCETES, &c.; also Zopf's monograph on Bacteria, *Die Spaltpilze* (Breslau, 1885); De Bary's *Lectures on Bacteria*, (2d ed. Leip. 1887); Klein's *Micro-organisms and Disease* (Macmillan, 1886); Trouessart's *Microbes, Ferments, and Moulds*, Int. Sc. Ser. (1886); Löffler's *History of Bacteriology*; Crookshank's *Manual of Bacteriology* (Lewis, Lond. 1887). Abundant references will be found in the last-mentioned.

Bactria, a province of the ancient Persian empire, lying north of the Paropamisus (Hindu Kush) Mountains, on the Upper Oxus. A northern branch of the same range separated it from the Sace, and it had Sogdiana on the north and Ariana on the south. It thus corresponded pretty nearly with the modern Balkh. Here many scholars locate the original home of the Aryan or Indo-European family of nations (see ARYANS). Its capital, Bactra or Zariaspa, was also the cradle of the Zoroastrian religion. Originally a powerful kingdom, it maintained its independence until its subjugation by the great Cyrus about 540 B.C., when it became a satrapy of the Persian empire. It was included in the conquests of Alexander, and formed a part of the kingdom of the Seleucids until the foundation, about 256 B.C., by Diodotus, of the Greek kingdom of Bactria, which extended to the Indus, and which after a long struggle was overthrown by the Parthians. Numerous coins with Greek legends have been found in the *topes* or burial-places to the north-east of Kabul. See also ASOKA, and ALPHABET, p. 188.

Bactrites, a genus of fossil Ammonitide, with a straight shell, and indented but not ramified septa. The genus ranges from the Lower Silurian to the Devonian.

Baculites, a genus of the family of Ammonitida, differing from the true Ammonites (q.v.) in the perfectly straight form of the shell, which tapers to a point, and is either round or compressed. The species, like the other Ammonitida, are all fossil. Baculites are characteristic of the chalk, and appear to have existed only towards the expiry of the period over which the existence of the Ammonitida extended.

Bacup, a rapidly increasing and very prosperous town of Lancashire, on the Spalden rivulet,

19½ miles N. by E. of Manchester by rail. Besides many churches of all denominations, the oldest dating from 1788, it has a mechanics' institute (1846, enlarged 1870), a market-hall (1867), a very large co-operative store that cost £22,000, &c. Bacup was constituted a municipal borough in 1882. Cotton-spinning and powerloom-weaving are the staple industries; and there are also dye-works, brass and iron foundries, and vast stone quarries. Coal-mines are worked in the neighbourhood. Pop. (1798) 1426; (1861) 10,935; (1871) 17,199; (1881) 25,033.

Badagry, a small British port, on the Slave Coast, Upper Guinea. At one time it carried on a large slave-trade, and had 10,000 inhabitants. It was from this place that in 1825 Clapperton and Lander started on their expeditions to explore the African interior.

Badajoz, capital of the Spanish province of the same name, is built on a slight hill crowned by a Moorish castle, on the left bank of the Guadiana, crossed here by a stone bridge of 28 arches. It is but 5 miles from the Portuguese frontier, and is 174 miles from Lisbon, and 315 from Madrid by rail. Badajoz is a fortress of the first rank, and the see of a bishop, and has an old cathedral built like a fortress, with a splendid organ, and paintings by Cerezo and Morales. Its monasteries have been secularised, and some of its numeries closed. Its chief articles of manufacture are hats, soap, coarse woollens, leather, and pottery. It has also a large trade in cattle. Pop. (1881) 22,376. Badajoz was the *Pax Augusta* of the Romans, the *Dur Augusto*, *Bathaljus* of the Moors. As one of the keys of Portugal, it has often been a place of importance in war. It was besieged in vain by the Portuguese in 1660, and again by the allies, in the Spanish War of Succession, in 1705. During the Peninsular war, Badajoz was besieged by the French in 1808, and in 1809, and again in 1811, when it surrendered, March 11, to Soult. It was thrice besieged by the English under Wellington: first on April 20, 1811, next in May and June of the same year, and thirdly in the spring of 1812, when he captured the city by storm, on the night of April 6, after a murderous contest, and a loss during the twenty days' siege of 72 officers and 963 men killed, and 306 officers and 3483 men wounded. The province of Badajoz has an area of 8687 sq. m., and a population of (1884) 457,365. See ESTREMADURA.

Badakhshan, a territory of Central Asia, lying between 36 and 38° N. lat., and 69 and 72° E. long., with the chain of the Hindu Kush on the S., and the Oxus, or Amu Darya, on the N. It is drained by the Kokeia, a head-stream of that river, and is famous throughout the East as a picturesque hill-country diversified with woods, rich pasture, and fertile, well cultivated valleys, its surface varying from 500 to 15,600 feet above sea level. Eastern travellers speak with rapture of its orchards, its fruits, flowers, and nightingales. It is rich too in mineral wealth—iron, rubies, and lapis-lazuli. Marco Polo was here in 1272-73; and Captain John Wood in the winter of 1837-38. Matveyeff saw part of the country in 1878. Faizabad (q.v.) is the capital. The inhabitants are largely Tajiks, an Aryan race speaking Persian. They are Mohammedans—Shiites in the mountains, and Sunnites in the plains. Their number is estimated at 100,000. The people of Badakhshan seem to have been always under the immediate rule of their own chiefs, at the head of whom is the Amir. They have generally, however, formed part of some great Asiatic empire. Thus, in the 18th century, Badakhshan belonged to the empire of Nadir Shah, after whose death it became subject to the Afghans. In 1823, however, the Uzbeks,

under Murad Beg, taking advantage of the disturbed state of Afghanistan, defeated the tribes of Badakhshan in a pitched battle; and two years after, their subjection was completed. The conquerors treated them most harshly, demolishing their towns, and either selling them as slaves, or carrying them off to people the unhealthy swamps of Kunduz. On Murad's death in 1845, Badakhshan passed to another Uzbek. The Afghans, however, soon reasserted their claims, and in 1859 were about to annex Badakhshan, when the Amir agreed to pay an annual tribute. In 1863 Jahander Shah, the Amir of Badakhshan, was superseded by Mahommed Shah. This gave rise to a struggle which ended in Jahander's nephews acquiring dominion by means of Afghan help. In 1873 England and Russia discussed and agreed upon a frontier between Badakhshan and Afghanistan. In September 1887 the Amir strictly prohibited Russians from entering the country. Badakhshan is sometimes made to include Wakhan, on the Upper Oxus, between Badakhshan proper and the Pamir Steppe (see PAMIR, and the map at AFGHANISTAN). See Yule's *Marco Polo* (1871); Wood's *Journey to the Source of the Oxus* (new ed. 1872); and Vambéry's *Central Asia* (1871).

Badalona, a seaport in the Spanish province of Barcelona, 5 miles N.E. of that town by rail. The fertile plain around is covered with gardens and orange-groves; the town has shipbuilding and a large glass-work. Pop. (1878) 13,749.

Badderlocks, also sometimes HONEYWARE or HENWARE (*Alaria esculenta*), an olive-coloured seaweed belonging to the *Pharospora* (see SEAWEED), and allied to the common *Laminaria*, which grows on rocks in deep water on the shores of Britain, Iceland, and the northern parts of Europe. It has a short cylindrical stem with lateral spore-bearing processes, and a membranous olive-green frond of 2-12 feet long, with a stout midrib. This midrib, together with the 'fruits,' is eaten by the inhabitants of the sea-coasts of Iceland, Denmark, Scotland, Ireland, &c., and is said to be the best of the esculent algae. The name is supposed to be a corruption of Badderlocks. See BALDER.

Baden, THE GRAND-DUCHY OF, is situated in the south-western corner of the German empire between Alsace-Lorraine and Württemberg, and is separated from Switzerland by the Rhine. Its area is 5824 sq. m.—considerably less than that of Yorkshire.

Surface and Hydrography. Physically, Baden falls into two divisions: the western plain, lying along the right bank of the Rhine, and the eastern highlands; the former occupying about a sixth of the whole duchy. Of the mountain districts, the Schwarzwald, or Black Forest (q.v.), is the most important, and attains a maximum altitude of 1903 feet. The Neckar highlands are lower and north of the Neckar Valley the Odenwald begins. Southward rise the extensive plateaus of the German Jura. Being drained by the Rhine and the Danube, Baden belongs to the basins of two opposite seas: the sources of the Danube, however, drain only some 350 sq. m. From Basel to below Mannheim the Rhine is the sole and the natural boundary. Its chief tributaries on the Baden side are the Neckar, the Murg, and the Elz. On the north-east the Baden territories are bounded by the Maine. Except a part of the Lake of Constance Baden has no lake of importance.

Produce.—As the difference between the highest and lowest points of Baden amounts to something like 4500 feet, there is naturally a great variety of temperature. The Rhine Valley of Baden is one of the warmest and most fruitful districts, not only of Germany, but of Europe. Grain, vegetables of all

sorts, tobacco, hemp, rape, opium, &c. are grown, and a large quantity of wine is produced. The rearing of cattle is carried on to a large extent. Honey is also an important product.

Minerals. The principal minerals are the products of the limestone quarries and of the clay and gravel pits, and gypsum, largely used for pavements. Coal, zinc, and manganese are found, and the production of salt and soda is important. Iron, lead, silver, and nickel were formerly wrought in the Black Forest, but the industry has become almost unprofitable, and now receives little attention. Baden is rich in mineral springs; as many as sixty are enumerated, and there are a great number of much-frequented watering-places, as Baden-Baden, Badenweiler, and others.

Manufactures, &c. The manufactures of Baden include ribbons and cotton fabrics, paper, leather, rubber goods, chemicals, machinery, tobacco, chicory, sugar, beer, trinkets, mirrors, wooden clocks, and straw-plaiting; the last two are characteristic of the Black Forest, and known all over the world. Of clocks alone over 700,000 are made annually. The manufactures of jewelry in Pforzheim are the most important in Germany. The chief articles of export are wine and timber.

Population, Religion, Education.—The population of Baden in 1880 amounted to 1,570,196, and in 1885 it had increased to 1,600,839. The Roman Catholics in 1885 numbered 1,005,704. Protestants numbered 564,871; Dissenters and Mennonites, 3212; and Jews, 27,052. The school-system of Baden is excellent; it also possesses a Protestant university at Heidelberg and the Catholic university of Freiburg.

Government. The sovereign is limited by a parliamentary constitution. The parliament consists of two chambers, the second chamber being made up of 63 representatives chosen for four years. The highest deliberative and executive body in the country is the council of state. The general debt of Baden in 1886 amounted to £522,000; that on the railways to £16,586,000. The military affairs of Baden are now exclusively regulated by the imperial power; the troops of Baden form the major part of the fourteenth corps d'armée of the empire. The effective war strength of the army is 45,000; peace, 15,000. Karlsruhe is the residence of the sovereign; the capitals of the four 'circles' are Constance, Freiburg, Karlsruhe, and Mannheim; and besides, there are four towns each with a population above 20,000.

History. The earliest inhabitants of Baden known to history were the Alamanni. These fell under the dominion of the Franks, and the dukedom of the Alamanni was abolished in 748 by Pepin the Little. In the 11th century, a Duke Berthold built the castle of Zähringen in Breisgau, and a descendant of his second son took the title of Margrave of Baden, and became the ancestor of the still flourishing House of Baden. He died in 1130. The present capital, Karlsruhe, was built in 1715 by the then margrave, Charles III. It is to his grandson, Charles Frederick, who succeeded in 1746, that Baden owes considerable accessions of territory and political importance. By favouring the policy of Napoleon, and joining the Confederation of the Rhine, he doubled his possessions in extent and population, and acquired successively the dignity of elector and the title of grand-duke. In 1811 he was succeeded by his grandson, who, after the battle of Leipzig, seceded from the Confederation of the Rhine, and (1815) joined the German Confederation, in which Baden held the seventh rank.

The Grand-duke Charles granted (1818) the charter which forms the basis of the present constitution. Charles was succeeded in the same year

by his uncle Ludwig, who was inclined to absolutism, and who, dying childless (1830), was succeeded by his brother Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional rule; but the tide of reaction soon seized the government, and a fluctuating contest between a reactionary cabinet and a growing opposition was carried on till 1846, when the constitutional Bock was made minister of the interior, and liberalism thus placed at the helm. The ninth parliament met (December 1847) under the most friendly and promising auspices; when the French revolution (February 1848) suddenly called the radical party into the most violent activity. Not satisfied with a multitude of liberal measures passed by the legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The troops having sided with the insurgents, the grand-duke fled, and a Constituent Assembly was called (May 1849). The duke had recourse to Prussian aid, and after several battles, was reinstated on his throne (July 1849); but the reactionary tendency was less marked in Baden than in most other German states. In 1859 a great conflict between the state authorities and the Catholic hierarchy ended in favour of the latter; two years later a definite settlement recognised the complete independence of the church, a privilege extended also to the Protestant Church of Baden. In 1864 liberal reforms reorganised the administrative and judicial systems of the country. In the conflict between Prussia and Austria in 1866, Baden took her place with the enemies of Prussia, and her troops fought in two ineffective battles against the Prussians. At the peace, Baden had to pay a heavy war indemnity, reorganise her army on the Prussian model, and in 1867, enter the North German Confederation. In 1870-71 the troops of Baden fought with distinction in the French campaign, and the grand-duchy became a part of the restored German empire. The Old Catholics have since been recognised, and elementary education has been secularised. The present grand-duke is Friedrich I. (b. 1826; suc. 1852). See GERMANY.

Baden, a town and fashionable watering-place in the Swiss canton of Aargau, on the left bank of the Limmat, 14 miles NW. of Zurich by rail. It has a pop. (1880) of 3692, and its sulphur-baths, which were known to the Romans as *Therma Helvetiorum*, yearly attract some 20,000 visitors. Their temperature is as high as 117° F. Baden, from the 15th to the beginning of the 18th century, was the seat of the Swiss diet.

Baden-Baden, a town in the grand-duchy of Baden, situated in the pleasant valley of the Oos, at the edge of the Black Forest, 8 miles from the Rhine, and 23 SSW. of Karlsruhe by rail. Pop. (1885) 12,782; but its visitors during the season, which is at its height in July and August, are often four times the number of the settled population. It is chiefly celebrated for its medicinal springs, which were known in the time of the Romans, Baden-Baden claiming to have been founded by Hadrian in the 2d century A.D. Numerous Roman antiquities have been found in the neighbourhood, and are preserved in a museum here, and remains of a vapour-bath and dungeons of the same period were discovered in laying the foundations of the new castle. Its 13 hot springs have a temperature of 115° to 150° F., are impregnated with iron, magnesia, and lime, with sulphuric and carbonic acids, and are especially recommended in chronic cutaneous diseases, gout, rheumatism, and stomach complaints. The chief spring (*Ursprung*) discharges in 24 hours about 4200 cubic feet of water. The reputation of Baden-Baden as a

bad received an increase from the visit of a number of French emigrants in the end of the 18th century, and since 1804 the grand-ducal family have done everything possible to make the place more popular. So early as 1815 the annual guests numbered about 2500, and since then its fame as a fashionable resort has yearly assembled not only so many, but so good a class of guests from all parts of the world, that in wealth, gaiety, and luxury, Baden-Baden may vie with the capitals of Europe. The number of visitors reached in 1883 to over 50,000. The season lasts from May to September. Even the winter season, which was started in 1872, keeps quite a number of strangers there. The beauty of Baden-Baden has been largely due to its gaming-tables, once the most renowned in Europe, but closed with the rest of the licensed German gaming-houses in 1872; besides paying a rent of over £14,000, they used to devote a like sum yearly to the beautifying of the promenades and public gardens. To the tables was devoted part of the *Conversationshaus* (1824), now the principal resort of visitors, including magnificently decorated concert and ball rooms, and a restaurant. All around are carefully kept pleasure-grounds, leading on one side to the new *Trinkhalle* (1842), or pump-room, which contains some large frescoes by Götzberger, representing legends of the Black Forest. The theatre (1862), the Friedrichsbad (1877), and the Villa Lenzbourg, occupied by Queen Victoria in 1872 and 1876, may also be noticed. The drives and walks around the town are beautiful. The picturesque ruins of the 'old castle' still crown the summit of the Schlossberg, and command a magnificent view of the Rhine valley from Spire to Strasburg. Lower down the hill, and directly overlooking the town, is the 'new castle' (1479), destroyed, like the old, by the French in 1689, but restored, and now the summer residence of the grand-duke. There is an English church in the town, built in 1868, and a Greek chapel for Russian visitors since 1882. See German works by Seefeldt (1872), Biermann (1872), Heiligenthal (1877); and Schmars (10th ed. 1884); and *The Mineral Waters of Europe*, by Tichborne and Prosser-James (1883).

Baden bei Wien (i.e. 'Baden near Vienna'), a much-frequented watering-place of Austria, on the Schwechat, 16½ miles S. by W. of Vienna by rail. It was the *Aqua Pannonica* of the Romans, and is still famous for its warm mineral springs, which are visited during the season by upwards of 10,000 persons. The springs are sulphurous, with much carbonic acid gas, have a temperature of 79 to 104° F., and are good for skin diseases, gout, and rheumatism. Fine bathing establishments were erected between 1848 and 1877. Pop. (1880) 9645.

Badenoch, a Highland district in the south-east part of Inverness-shire, 45 miles long by 19 broad, bounded by Lochaber, Athole, Braemar, and Moray, and traversed by the Spey. It is much covered with forest, and is chiefly composed of gneiss rock, with a little granite. It was a lordship, held from 1230 by the eldest branch of the great house of Comyn, on whose forfeiture in 1306 Bruce bestowed it on his nephew Randolph. In 1371 King Robert II. gave it to his son, 'the Wolf of Badenoch,' on the failure of whose descendants it reverted to the crown, which, in 1452, granted it to the Earl of Huntly.

Badge (etymology unknown, sometimes given from Lat. *badal*, 'I carry'; more probably connected with *badger*), a figure or emblem used, either with or without a motto, as the distinctive cognisance of a family. Family badges, which originated in the infancy of heraldry, and continued in high favour down to the 15th century or later, were sometimes taken from a

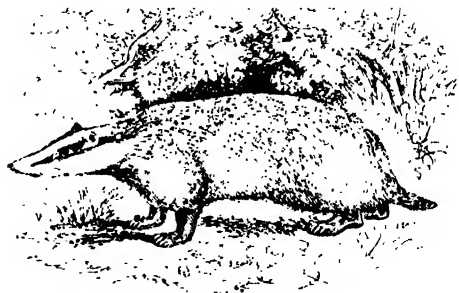
bearing in the family coat, and sometimes bore allusion to the owner's name, estate, or office. While the banner, shield, and jupon of the knight displayed his armorial coat, and the crest surmounted his helmet, the badge glittered on his standard and penoncelle, and on the sleeve, breast, or back of his retainer, and occasionally helped to decorate his armorial seal. Devices, otherwise analogous to badges, differed from them as belonging to individuals, not families. The *fleur-de-lis*, as the badge of the kings of France, dates as far back as the reign of Louis VII. (1137-1180). Of the English royal badges, which have varied much, a few may be enumerated. A star between the horns of a crescent appears on the great seals of Richard I., John, and Henry III., and a castle (allusive to his descent from the house of Castile) on that of Edward II. An ostrich feather was used by Edward III.; and the same cognisance was borne argent by the Black Prince, and ermine by John of Gaunt. None of the sovereigns of the house of Plantagenet were in the habit of using the *planta genista*, commonly known as the badge of that house; but a livery collar of broom pods with a white hart pendant appears in the portrait of Richard II. at Wilton. Of the famous rival cognisances of the houses of York and Lancaster, the red rose was first adopted by Henry IV., and the white by Edward IV. The Tudor sovereigns used the red and white roses variously united, per pale, quarterly, and one within the other. The thistle, as the badge of Scotland, seems to have been first used by James III.; and on the union of the crowns, the rose and thistle were used dimidiated and crowned. The royal badges of the United Kingdom as now in use (settled by sign-manual in 1801) are—a white rose within a red, crowned, for England; a thistle proper, crowned, for Scotland; a harp or strung argent, and a trefoil vert, for Ireland; and, on a mount vert, a dragon passant, wings expanded, and endorsed gules, for Wales. Among the best known badges of the English nobility are the crescent of the Percies, the buckle of the Pelhams, the bear and ragged staff of the Earls of Warwick, and certain intertwined cords known as knots, the forms of which have sometimes been suggested by the initial letter of the name or title of the bearer. In the Wake and

It has been the usage of the Highland clans to appropriate certain plants, chiefly native, as their badges, common heat being the badge of the Macdonalds, bell-heather of the Macdonalds, holly of the Mackenzies and Macleans, box of the Macintoshes and Macphersons, fern of the Chisholms, fir clubmoss or wild myrtle of the Campbells, &c.

The term badge is also applied to the distinctive decoration of an order of knighthood. Badges of this description are noticed in the separate articles relating to the different knightly orders; those of baronets in the article BARONET.

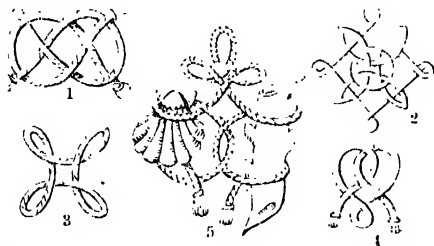
Marks of distinction used in party warfare, and devices adopted by clubs or associations, are sometimes in loose popular language called badges. Cockades are the subject of a separate article. See also DEVICE, CREST, HERALDRY.

Badger (*Meles*), a genus of carnivores of the *Mustelida* or Weasel and Otter family. The Skunks (*Mephitis*), Sand-bears (*Arctonotus*), American Badgers (*Taxidea*), Ratsels (*Mellivora*), &c., are closely related genera in the same subfamily as the Badger (*Meles*). Badgers, like the rest of the family to which they belong, are almost quite plantigrade i.e. they walk on the whole



Badger (*Meles vulgaris*).

sole of the foot, and not merely on the fore part of it. The body is thus brought nearer to the ground than it otherwise would be from their length of limb. The lower jaw is locked into its socket in a very remarkable way, which explains their tenacious grip. The head is long, with a pointed muzzle; the tail short; the skin very thick, loose, and tough; the hair long. Both ears and eyes are small. The gait is slow, the habits nocturnal and solitary. There are five toes on each both of the fore and hind feet, and the feet are peculiarly adapted for digging and burrowing. A peculiar characteristic of the badgers is the possession of a bag beneath the tail, for the secretion of a peculiar substance, of a disagreeable odour, which is supposed to be of use in directing the sexes to each other in their solitary wanderings.—The Common Badger (*M. taxus* or *M. vulgaris*) is the only bear-like quadruped now found in the British Islands, and that only rarely. It is widely diffused over Europe and the middle parts of Asia. The colour is grayish brown, verging to red above and black beneath; the head white, with a longitudinal black band on each side; the body long but robust, in size about equal to that of a small fox, the hair coarse and reaching to the ground as the animal walks. The average length is 2 feet 6 inches, and the height at the shoulder 11 inches. It haunts the gloomy recesses of woods, or thick plantations on the sides of hills, and digs for itself a deep and well-formed domicile, consisting of more than one apartment, the single entrance to which is by a deep, oblique,



1, Wake and Ormond knot; 2, Lacy knot; 3, Bowen knot; 4, Heneage knot; 5, Dacre badge.

Ormond knot (fig. 1), it is not difficult to trace a W and two Os. The Bourchier knot, as seen on the tomb of Archbishop Bourchier at Canterbury, bears a resemblance to two Bs, and the Stafford knot to two Ss. The Lacy knot (fig. 2) contains within it a rebus on the four letters of the name 'Lacy.' As examples of the badges of two different families entwined by a knot and used by the descendants of both, are the badge of the Dacres (fig. 5), combining their own escudo-shell with the ragged staff of Neville; and that of Edward, Lord Hastings, uniting the garbe of the Peverells with the sickle of the Hungerfords.

and even tortuous excavation.' In such an excavation as this, the animal sleeps during the day and through the winter. It uses its nose in digging, and scrapes with the fore-paws, flinging the earth as far back as possible, and when the accumulation is considerable, pushing it away by means of the hind-feet. The habits of the badger are extremely cleanly. It is one of the most perfectly omnivorous of animals, in a wild state as well as in confinement; fruits, roots, beech-mast, eggs, young birds, small quadrupeds, frogs, snails, worms, and insects, equally constitute its natural food. For the sake of the larvae of wasps and wild bees, it even ventures to dig up their nests, its hide being impervious to their stings. It is often caught by digging, or by placing a sack in the mouth of its hole, when it is out at night. Dogs sent into the hole are often foiled by the earth which the animal throws back upon them, to block up their way, nor is it easy for a dog to contend with it, owing to the great strength of its legs and jaws. A barbarous sport, called badger-baiting, or *dearing the badger*, was formerly common, but has been prohibited by act of parliament since 1850. A badger kept in a barrel was assailed by dogs, and at last, yielding to superior numbers, was dragged out, upon which it was released, and allowed to go back to its den, to recover itself, and be baited again, which happened several times daily, when the badger was kept as an attraction to a public-house of the lowest sort. The verb to *badger*, expressive of persevering annoyance by numerous assailants, was originally employed with reference to this practice. The flesh of the badger is said to be very agreeable, particularly when cured like hams. It is usually fat, like that of most sluggish heavy animals. In China it is much used for food. The badger is easily domesticated when taken young, and becomes very tame. In Scotland and the north of England, a badger is still called a *Beck*, its Anglo-Saxon name, preserved in the name of some places; in some parts of England it is termed a *Greg*. The Indian *Bhalú-soor* (i.e. Bear-pig), or *Sand-bear* (*Arctomys colliculus*), closely resembles the badger, but is taller, and has a more hog-like muzzle, and a longer tail. Its habits and its food are very similar, and when attacked, it likewise defends itself with great vigour. It is chiefly found in hilly districts. The American Badger, or *Taxel* (*Taxidea americana*), is a distinct, more carnivorous genus, differing in dentition and in some features of the skull. It chiefly preys on small animals, such as marmots, which it pursues into their holes in the sandy plains near the Missouri and the Rocky Mountains. In its pursuit of the smaller quadrupeds upon which it feeds, it enlarges their burrows, and renders some parts of the plains dangerous to persons on horseback. Its prevailing colour is hoary gray in winter, yellowish brown in summer, and under parts generally yellowish white; a white stripe runs from the nose over the forehead to the neck. The hair becomes not only very long but woolly in winter.—The burrowing power of this animal are extraordinary. It sometimes makes its ways 6 or 7 feet deep, running under ground to a length of 30 feet.

Badger Dog. See DACHSHUND.

Badghis, a region north of Herat, comprising the country between the Murgab and the Hari-rud rivers, as far northward as the edge of the desert. It lies just to the south of the boundary line between Afghanistan and the Russian territories, as defined in 1887.

Badj'ay-Lablich, DOMINGO, an enterprising traveller, born at Barcelona in 1766. Early smitten with the love of travel and adventure, in 1801 he

crossed to Africa, disguised as a Mussulman, under the name Ali-Bei. From his youth he had been a devoted student of Arabic, and his knowledge of the manners and customs of the people was so intimate that he could escape detection, while to make his conformity complete, he had even circumcised himself. His tact and talents gained for him such esteem that he was invited to the court of the emperor of Morocco. After a two years' residence in Morocco, he set out on a pilgrimage to Mecca, and travelled through Barbary, Greece, Egypt, and Syria, meeting everywhere a kind reception. At the holy city of the Moslems he took his part duly in all the solemn rites, and has the distinction of being the first Christian that had visited it since the institution of Islam. In 1807 he returned to Spain, attached himself to King Joseph, and was appointed in 1812 Prefect of Cordova; but on the fall of Napoleon's power two years later, he was compelled to leave the country. He went to Paris, where in 1814 he published an account of his travels under the title *Voyage d'Ali-Bei en Afrique et en Asie*. His work was translated into most of the European languages. Four years after the publication, he set off on another journey to the East, but died in Syria on his way to Damascus, 30th August 1818.

Badminton, the seat of the Duke of Beaufort (q.v.), in the south of Gloucestershire, 7 miles E. of Yate Junction. It is a stately Palladian edifice of 1682, with a fine park. From it have been named a kind of claret cup, and a game, a predecessor of lawn tennis, played with a shuttlecock instead of a ball.

Badrinath, a peak of the main Himalayan range, Garhwal district, North western Provinces, India, 22,901 feet above the sea. A shrine of Vishnu stands on one of its shoulders at a height of 10,400 feet, about 56 miles N.E. of Srinagar. This temple overhangs a sacred tank, which is supplied from a thermal spring in the neighbourhood. As ablution in these waters is held to cleanse from all past sin, Badrinath is a grand resort of pilgrims, every year bringing large numbers; but every twelfth year, when a periodical festival is celebrated, collecting fully 50,000.

Baedeker, KARL, a German publisher, born in 1801 at Essen, where since 1797 his father had carried on the business of printer and bookseller. He himself started in business in 1827 at Coblenz, where he died, October 4, 1839. He is best and everywhere known as the originator of a series of admirable guidebooks. With Murray's 'Hand-books' for their pattern, the German works, in the course of successive editions, have been so improved and entirely rewritten, that they have come in most essentials to equal, and in some to surpass their models; and now the guides are published in the principal languages of Europe. The business was removed in 1872 to Leipzig, carried on under the son of the founder. The first guidebook published by Karl Baedeker was a small book on the Rhine, of which in 1839 he produced a third edition entirely rewritten by himself (21st. ed. 1881). Between that time and 1888, when an excellent guide to Great Britain was published, the word Baedeker has become almost a synonym for guidebook.

Bael, or BHEL. See EGLE.

Bañna, a Spanish town 25 miles SSE. of Cordova, with a trade in grain and oil. In the castle here, Pedro the Cruel murdered the Moorish king of Granada with all his train. Pop. (1878) 13,336.

Baer, KARL ERNST VON, a distinguished Russian naturalist, who contributed very largely

to the progress of natural science, especially of embryology, was born February 29, 1792, in Esthonia. During 1810-14 he studied medicine at the university of Dorpat, but in 1814 studied comparative anatomy in Würzburg. In 1817 he went to Königsberg, where, two years after, he was appointed professor of Zoology, and charged with the organisation of the zoological museum. In 1834 he was called to St Petersburg, and was soon known as one of the most active members of the Academy. In 1837 he visited Nova Zembla; and in 1851-56 he devoted much time and study to the fisheries on Lake Peipus, the Baltic, and the Caspian Sea, publishing a large work thereon, and suggesting many improved methods. He specially applied himself to embryology; and to his laborious investigations we owe most valuable discoveries in regard to the development of animal life. Beginning with his *Epistola de Ori Mammulium et Hominis Genesi* (Leip. 1827), he still further elucidated this subject in a great work on development of animal life from its first germ (*Entwickelungs-geschichte*, 1828-37), and one on the development of fishes (1835). In 1864 the fiftieth year of his doctorate was celebrated by the Esthonian nobility, at whose expense a splendid volume was published, containing Baez's autobiography. He died November 28, 1876. His works are distinguished by lucidity as well as keen observation and brilliant speculation; they include, besides those above named, a work on two-bodied monsters. His *Reden und Kleine Aufsätze* appeared in 1864-75; the *Beiträge zur Kenntniss des Russischen Reichs* (by him and Helmersen, in 26 vols.) in 1864-75.

Baeza, a handsome old town of Spain, in the province of Jaen, 9 miles from a station of its own name, this being 160 miles S. of Madrid. The *Baitha* of the Romans, and the seat of Moorish califs and kings, with 150,000 inhabitants, it never fairly recovered from its sack by the Castilians in 1228. Its principal buildings are the quondam university (1533) and the oratory of St Philip de Nerí. Pop. (1878) 14,377.

Baffa. See PAPHOS.

Baffin, WILLIAM, navigator and discoverer, is believed to have been born in London about 1584; but the earliest known fact regarding him is that he sailed in 1612 as pilot of the *Patience* from Hull, on a voyage of discovery to Greenland. In 1613-14 he served in the Spitzbergen whale fishery, and he wrote an account of this and his previous voyage. In 1615 he took service with a company as pilot of the *Discovery* in search of a North west Passage, and made a careful examination of Hudson Strait; his recorded latitudes and notes of the tides are in remarkable agreement with those of a later date. In the following year, with Captain Bylot, he discovered, charted, and named Smith's Sound, and several others, and explored the large inlet now associated with his name. Later investigation has confirmed his descriptions. His latest voyages, 1616-21, were to the East. At the siege of Ormuz, which the English were helping the Shah of Persia to recover from the Portuguese, he was killed by a shot, 23d January 1622. See *Voyages of William Baffin*, 1612-22, edited by C. R. Markham (1880).

Baffin Bay, a gulf, or rather sea, on the NE. coast of North America, extending between Greenland and the great islands NE. of Hudson Bay (one of which is called Baffin Island), in 69° to 78° N. lat. It is about 800 miles long, with an average breadth of 200. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. Baffin Bay communicates with the Atlantic Ocean by Davis Strait; and with the Arctic Ocean by Smith Sound on the north, and Lancaster Sound on

the west. Baffin Bay, discovered in 1562, was first explored in 1615 by William Baffin, pilot of an expedition commanded by Bylot. Whale and seal fishing are prosecuted to a large extent in Baffin Bay, which, on account of ice, is only navigable for some four months in summer.

Bagamoyo, a village on the east coast of Equatorial Africa, opposite the island of Zanzibar. From this point caravans often start for the interior.

Bagasse, also called Cane-straw or Cane-trash, is the refuse left after the expression of the saccharine matter from the cane in the manufacture of sugar. See SUGAR.

Bagatelle (Fr., 'a trifle'), a game somewhat resembling billiards. A bagatelle-board is usually about 7 feet long and 21 inches broad; it is of slate, and is lined with cloth and cushioned; and a game is played on it with nine small ivory balls and a cue or mace. The player's object is to put the balls down in nine numbered holes at the further semicircular end of the board. The game is as old at least as 1819.

Bagdad, the capital of the province of the same name in the SE. of Asiatic Turkey, is situated on both banks of the Tigris, about 500 miles from its mouth, in 33° 20' N. lat., and 44° 23' E. long., in a flat, treeless plain of considerable extent, which is dotted with the ruins of ancient buildings. The entire city is surrounded by a brick wall, 5 miles in circumference and 40 feet high, but in some places broken down, and by a deep dry ditch; the two parts are connected by a bridge of boats, 220 yards long, and the communication is guarded by a citadel. There are four gates, the finest of which, bearing date 1220, has remained closed since 1638. It has an extremely picturesque appearance from the outside, being encircled and interspersed with groves of date-trees, through which one may catch the gleam of domes and minarets; but it does not improve on closer inspection. The streets are narrow, crooked, unpaved, and dirty, full of ruts, and strewed with garbage, which, however, is for the most part removed by dogs, the only public scavengers in the East. The houses have, in general, no windows towards the front, and are built of old, yellowish-red brick, but their interior is often very gorgeously decorated. The vaulted ceilings, rich mouldings, inlaid mirrors, and massy gilding, bring back to the recollection of the traveller the golden prime of good Haroun Al-Raschid. Bagdad contains upwards of 100 mosques, though barely 30 of them are in use; and a large general hospital has recently been erected. These, together with the khans, bazaars, baths, and the palace of the governor, are the only noticeable buildings in the city, whose public edifices, indeed, are meaner than those of any other oriental town of a like size. The domes and minarets, the earliest dating from 1235, are ornamented with glazed tiles and painting, in green and white.

The bazaars exhibit the produce of both Turkish and European markets; but commerce has greatly decreased since Persia began to trade with Europe by way of Trebizond on the north, and by the Persian Gulf on the south. Nevertheless, though no longer the chief emporium of merchandise between East and West Asia, Bagdad still carries on a considerable traffic with Aleppo and Damascus, and has manufactures of red and yellow leather, silks, and cotton stuffs. Of late years many European houses have settled agents in the town, and Britain, France, and Russia have also consuls there. Dates, wool, grain, and *timbuc* (a substitute for tobacco) are exported, and a number of horses are sent into India. Of the population, variously estimated at from 60,000 to 180,000, the greatest part are Turks and Arabs;

the remainder are native Christians, Jews, Armenians, Hindus, Afghans, and Persians. In summer, the heat is oppressive, ranging from 75° at sunrise to 122° F.; rain does not fall on more than twenty or thirty days throughout the whole year; but when the snows melt on the Armenian hills, the Tigris becomes a majestic, and often a destructive river. In 1831 an inundation destroyed one-half of the town, and several thousand lives. Cholera visits it periodically; in 1831, 4000 people perished daily for several days from its ravages. In 1870-71 Bagdad also suffered severely from famine. Since 1836, British steamers have plied on the Tigris between Bagdad and Basra; and here is one of the chief stations of the Anglo-Indian telegraph.

Bagdad was generally believed to have been founded by the Abbaside calif Almansur, 764 A.D., but Rawlinson, in 1848, discovered below the normal river-level walls of brickwork, each brick bearing the name and titles of Nebuchadnezzar. In the 9th century it was greatly enlarged by Haroun Al-Raschid, who erected numerous edifices on the east side of the Tigris, and connected its two banks by a bridge of boats, and under his son, Al-Mamun, it became the great seat of Arabic learning and literature. A hundred years later, Bagdad was ravaged by the Turks. In 1277 the grandson of Genghis Khan, Hulaku, put an end to the old califate; but the descendants of this Tartar conqueror were expelled by Timur, who took the city in 1393. After several vicissitudes, it remained in the possession of a Turkoman chief, whose dynasty governed until 1477. In the beginning of the 16th century, Shah Ismael, the founder of the Saffide dynasty in Persia, made himself master of it; since which period it has repeatedly been a bone of contention between Turks and Persians. After a memorably obstinate siege, it was conquered by the sultan, Murad IV., in 1638. Nadir Shah vainly essayed to retake it in the 18th century, and ever since it has been under the sway of the Porte.

The province of Bagdad, lying between Arabia and Persia, comprises the greater portion of the basin of the Lower Euphrates and Tigris, and is estimated to have a population of 4,000,000. The part between the two rivers, including ancient Mesopotamia and Babylonia, though now mostly a barren wilderness, was in ancient times luxuriantly fertile, the seat of mighty empires, and inhabited by industrious populations. The inhabitants are composed of Turkomans, Armenians, Turks, Jews, Arabs, and Kurds; the last of which races are notorious for their open and audacious depredations. For a description of the cities which in ancient times adorned this region, see ASSYRIA, BABYLON, Ctesiphon, NINEVEH, SELEUCIA.

Bagehot. WALTER, English economist and journalist, was born at Langport in Somersetshire, in 1826. He attended school at Bristol, and in 1842 went to University College, London, where he graduated in 1848; afterwards studied law, and was called to the bar in 1852, but joined his father in his business of banker and shipowner at Langport. In 1858 he married a daughter of the Right Hon. James Wilson, founder of the *Economist* newspaper; and from 1860 till 24th March 1877, when he died in his native town, he was the editor of that important journal. Bagehot's literary activity began in 1851, when he was in Paris at the time of the *coup d'état*, and wrote seven letters to a London paper, justifying the policy of Napoleon. The letters were published after his death in the first volume of his *Literary Studies*. Besides some other works of minor importance, there appeared during his lifetime: *The English Constitution*, a book of great value, translated into several modern languages; *Physics and Politics*, a treatise published in the International Scientific Series, which

applied to the discussion of politics the theory of evolution; and *Lombard Street*, an able work on the money-market. Among his posthumous publications may be mentioned his *Literary Studies*, in 2 vols., and his *Economic Studies*, in 1 vol. Bagehot was a vigorous and brilliant writer, and a thinker of great acuteness and suggestiveness. While adhering to the current English type of thought, both in politics and economics, he was thoroughly independent in the formation and expression of his views, and was readier than most of his contemporaries to give weight to the historical and evolutionary side of things. In particular he recognised the limitations of the Ricardian economics, and considered political economy as a science not of rigorous laws, but of tendencies.

Baggesen. JENS, a well-known Danish poet, but who also has a place in German literature, was born at Korsör, in the island of Zealand, February 15, 1764. While still a student at Copenhagen, he made a reputation as a poet by his lyrics and *Comic Tales* (1785). He made a lengthened tour through Germany, Switzerland, and France, and from this time German was to him a second mother tongue. In 1811 he was appointed professor of Danish Language and Literature at Kiel; but three years after he removed to Copenhagen, where he became involved in an unseemly strife with Oehlenschläger, and in 1820 he left Denmark, never to return, for he died at Hamburg, October 3, 1826, whilst on his homeward way. His most important work is his idyllic epic, *Parthianis oder die Alpenreise* (1804), which contains single passages of great beauty. Baggesen possessed little lyrical genius, though many of the poems are admirable. He was strong in satire, and maintained a powerful polemic against the extravagances of the German romantic poets. The sphere in which he shone most conspicuously was the serio-comic. His so-called 'humorous epic' of *Adam and Eve*, published shortly after his death, is a singular mixture of humour, pathos, and levity. His style is excellent, and in this respect the Danish language owes much to him. His German works fill 5 vols. (1836); his Danish, 12 (new ed. 1845-48). See his *Late* by his son (4 vols. 1849-56); and Arentzen, *Baggesen og Oehlenschläger* (8 vols. Cop. 1870-78).

Baghal. BAGAL, or BHAGAL, one of the Panjab hill-states in North-west India, on the south or left bank of the Sutlej, with an area of 124 sq. m. Pop. (1881) 20,633.

Baghelkhand, the name of five native states, under the political superintendence of the governor-general's agent for Central India, lying to the south of the districts of Mirzapur and Allahabad. The total area is 11,324 sq. m.; pop. (1881) 1,512,595. The following are the states included in the agency, which up till 1871 was under Bundelkhand: (1) Rewah, in the east, by far the largest and most important, with a pop. of (1881) 1,305,124. It is rich in minerals and forests. The capital and residence of the political agent is Rewah, 131 miles SW. of Allahabad. Satna is the chief railway station. (2) Nagode, on the eastern border of Rewah, is traversed by the East India Railway; the capital, of same name, is a British cantonment. Pop. (1881) 79,629. (3) Maihar, north of Jabalpur district; pop. 71,700. (4) Sohawal, north of Nagode; pop. 37,747. (5) Kothi; pop. 18,386.

Bagheria, or BAGARIA, a town of Sicily, 8 miles E. by S. of Palermo by rail. It is beautifully situated at the base of the isthmus which separates the Bay of Palermo from that of Termini, and is surrounded by groups of palatial villas of the Sicilian nobility. Pop. 12,650.

Baghistan. See BEHISTUN.

Bagimont's Roll, the name given to a valuation according to which the ecclesiastical benefices of Scotland were taxed from the end of the 13th century to the Reformation. It took its name from an Italian churchman, Boiamond (or Bajimont) of Vicci, a canon of the cathedral of Asti in Piedmont, who was sent by the pope to Scotland in 1274 to collect the tithe or tenth part of all the church livings, for a crusade. Hitherto, the Scotch clergy had been taxed according to a conventional valuation called the *Antiqua Taxatio*; but Boiamond set this aside. The clergy protested, and in a provincial council held at Perth in August 1275, they prevailed upon Boiamond, by promises and money, to return to Rome, there to entreat the pope to modify the subsidy. But the pope refused. Boiamond returned to Scotland to complete a valuation roll of its benefices; but he died before the tax itself was wholly collected. No complete copy of Bagimont's Roll in its original shape is now known to exist. A contemporary manuscript of so much of the Roll as applies to the archdeaconry of Lothian is preserved at Durham. A copy of Bagimont's Roll, as it appears to have existed in the reign of King James V. (1513-42), is preserved in the Advocates' Library at Edinburgh, in a hand of the beginning of the 17th century. It is full of inaccuracies; and it omits all livings of less than 40 marks a year. It was printed in *Archæologia*, vol. xvii. (1813). See J. Robertson's *Councils Scotiæ* (Ban. Club), l. lxx.

Bagirmi. BAGHERMI, a country in Central Africa, bounded on the W. by Bornu and a portion of Lake Chad, and with the powerful sultanate of Wadai to the NE. Its area is estimated at nearly 71,000 sq. m. The surface is flat, with a gentle rise towards the north, its general elevation being about 1000 feet above sea-level. It is traversed and watered by the Shari and its affluents. The soil yields durra and millet, which the natives barter for tobacco, pearls, and cowry shells. The total population is about a million and a half. Mohammedanism has been introduced among them, but gross superstitions still prevail. Dr Nachtigal describes the natives as of the Sonhai type, of low stature, and not of pleasant features. Though they wear almost no clothing, they are in many respects semi-civilised, having a regular government in the capital Masaïa, as well as a military system. The sultan of Wadai took the capital in 1871, reducing the sultan of Bagirmi to a more complete state of vassalage to him. The country was first visited by Dr Barth in 1872, afterwards by Dr Nachtigal in 1872. See vol. ii. of Nachtigal's *Sahara and Sudan* (Berlin, 1881).

Baglivi, GIORGIO, an illustrious Italian physician, born at Ragusa in September 1669. He studied at Salerno, Padua, and Bologna, and in 1692 went to Rome. Here, through the influence of his friend Malpighi, he was appointed professor of Anatomy at the college of La Sapienza where he died in 1707. His work, *De Fibra Matrice*, is the foundation of the theory of medicine known as 'solidism,' which refers all diseases to changes in the solid parts of the body, and which claims that solids alone possess vital properties and can be the seat of pathological phenomena.

Bagnacavallo, an old town of Italy, still walled, and formerly noted for its strong castle, 11 miles W. of Ravenna. It contains a beautiful cathedral. Bartolommeo Pamenelli (1484-1542), the Bolognese painter, who is generally known as Il Bagnacavallo, was a native. Pop. 3843.

Bagna'ra, an Italian town, on the Gulf of Gioja, 16 miles NE. of Reggio. Excellent wine is produced in the neighbourhood. Pop. 6749.

Bagnères, the name of two towns in the Pyrenees, France, both well known as watering-places.—BAGNÈRES DE BIGORRE, on the Adour, in the department of Hautes Pyrénées, is situated 1820 feet above sea-level, at the base of Montalivet, and at the entrance to the romantic valley of Campan, 13 miles SE. of Tarbes by rail. Besides its extensive bathing-houses, it has a college, a theatre, a Pyrenean museum, a trades-hall; and contains a pop. of 7634. By the Romans it was known as *Vicus Aquensis Balnearie* or *Aqua Bigerrorum*. It was destroyed by the Goths, but the fame of its waters survived, and is now so great that it is visited by about 20,000 strangers yearly. It has fourteen baths, the chief Les Thermes and Villa Théas, and above fifty springs (90° to 135° F.), recommended for catarrhal and nervous diseases. Woollens, linens, and *Bartegs* (q.v.) are manufactured here. BAGNÈRES DE LUCHON is situated in the department of Haute Garonne, in the beautiful valley of Luchon, 43 miles by road SE. of Bagnères de Bigorre, and 22 by rail S. of Montrejeu Junction. Its cold, tepid, and hot sulphurous waters (up to 130° F.) are recommended in rheumatism, gout, cutaneous diseases, and paralysis, and attract some 10,000 visitors annually. Pop. 3982.

Bagnes, the convict prisons of France. The name is from the Italian *bagno*, used originally of a bath in the Seraglio at Constantinople, and then apparently of a prison for slaves in it or adjoining it. The bagnes superseded in 1748 the old punishment of the Gallies (q.v.); but in 1852 they were themselves abolished, the imperial government substituting for them deportation to Guiana. The latest existing bagnes were those at Toulon, Brest, and Rochefort.

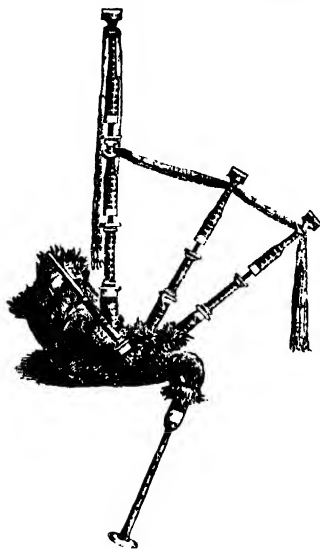
Bagni di Lucca, a bathing-place of Italy, 17 miles N. of Lucca. Pop. 900. It is situated in the fine valley of the river Lima, a branch of the Serchio, and has hot springs of various temperature from 96° to 136° F.

Bagno a Ripoli, an Italian village, 5 miles distant from Florence, containing baths, around which wealthy Florentines have built palaces and villas.

Bagno in Romagna, an Italian bathing-place, 35 miles E. by N. of Florence, on the right bank of the Savio, not far from its source. It has hot springs of temperature 108-110° F., in which Natron (q.v.) is present. Pop. (1881) 1875.

Bagpipe, a wind-instrument, whose fixed characteristic has always been two or more reed-pipes attached to and sounded by a wind-chest or bag; which bag has in turn been supplied either by the lungs of the performer or a bellows. Some such instrument seems to have been generally known, at least throughout Europe and Asia, from a very early period. It was known to the Hebrews, Greeks, and Romans, and appears on their sculptures and coins—e.g. a coin of the Emperor Nero, who is said to have been a performer upon it. An ancient terra-cotta, excavated at Tarsus in Asia Minor, by Mr W. Burekhardt Barker, and supposed to date from about 200 B.C., represents a wind-chest with vertical rows of reed-pipes firmly fixed to the body of a performer. Sir William Onseley met with it in Persia, where it is called 'reed-bag.' It is known in China and in some parts of India, and still continues in use in many countries of Europe, including Italy, the south of France, and Britain. In the 15th and 16th centuries it was common in Germany and England; carvings occur of it in churches at Boston, Great Yarmouth, and Hull; as also at Melrose. It is mentioned by Chaucer and Spenser, and several times by Shakespeare. Fuller in his *Worthies* describes the Lincolnshire bagpipe, and it

was played at Manton in that county not long before 1850. At what time it was introduced to Scotland is uncertain. The earliest extant specimen is probably an instrument bearing the date 1409, and in 1887 in the possession of Messrs Glen of Edinburgh. Except that it wants the large drone, which was introduced only at the beginning of the 18th century, it is in all respects similar to the Highland bagpipe of the present day.



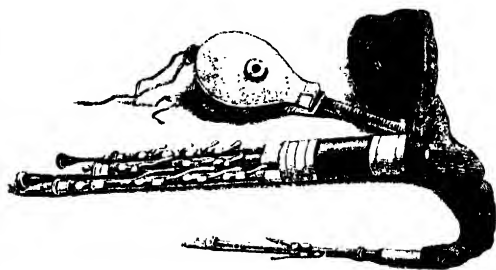
Highland Bagpipe.

There is an entry in the Exchequer Rolls in 1362 of 40s. 'paid to the king's pipers,' which may indicate the use of the bagpipe at that date, and it is certainly mentioned in the poem of James I., *Pebblis to the Play*. James VI., on a Sunday of 1581, returned from church at Dalkeith with two pipers playing before him; and the bagpipe has been employed in the services of the Catholic Church—e.g. at Edinburgh in 1536. It is supposed to have

first been used in war by the Highlanders at the beginning of the 15th century, superseding the war-song of the bards. It has left its traces very distinctly in music, many popular national airs of different countries being evidently founded upon its drone bass and imperfect scale; while imitations of its effect are to be found in the works of many of the great modern composers. The Scotch Highland bagpipe is the only form of the instrument which is keeping its ground in Britain. It consists of an air-tight leathern bag, inflated by the breath of the player through a valved tube; and from this bag the sound proceeds, through three wooden pipes containing reeds of fixed tone called *drones*, which furnish a continuous bass, and another reeded pipe of conical bore with holes in it, which produces the melody, and is termed the *chanter* (see fig.). The drones have reeds somewhat like those of the organ, the two smaller producing a note in unison with the lowest A of the chanter, the larger one A an octave lower. The chanter has a double reed like that of the oboe or bassoon, and has seven holes in front for the fingers, and one behind for the thumb of the left hand. The compass is only nine notes, from G in the treble clef to A above it; these, however, do not form a diatonic scale, not being all accurately tuned to each other; the general effect of the music approximates to the key of A, but with the sevenths flat. This imperfection of scale, together with its somewhat harsh tone, is the cause of it: unpleasant effect upon the accurately sensitive ears of those accustomed to music in the natural diatonic scale; but from the same cause results its semi-barbarous, exciting stimulus upon the Highlander in the battlefield. In playing, the drones are thrown over the left shoulder, the bag tucked under the left arm, the blowpipe taken in the lips, and the chanter held with the

fingers. In the Highlands, the 'skirl' of the bagpipe is equally esteemed in the 'lament' or at the merrymaking. The piper usually walks up and down while playing. The very abundant music for the instrument comprehends reels, strathspeys, marches, and pibrochs, a special peculiarity being the use of frequent and sometimes largely extended groups of ornamental passing notes, termed *warblers*. First-rate pipers have been known to introduce warblers of eleven notes between the last up beat, and the first down beat of a bar. Warblers of seven notes are common, and five usual, but their effect can only be understood from hearing the performance of a really good piper. That many of the older airs are written in the so-called pentatonic scale, omitting the fourth and seventh, is probably to be accounted for by the already-mentioned fact that several of the intervals on the instrument are not in perfect tune, and would naturally be avoided. Until recently bagpipe music was taught and even written in a notation of its own; but there are now several large collections of the music printed in ordinary notation. In music printed for the Highland pipes, no signatures are required, its nine notes being invariable. Each burgh in Scotland had formerly one or more pipers, and they formed also a regular part of the retinue of the Highland chieftains, the office being in both instances frequently hereditary. The most famous performers were the MacCrimmons, who for several generations were hereditary pipers to the MacLeods of MacLeod, and the last of whom died in 1822. Next to them the MacArthurs, pipers to the MacDonalds of the Isles, were held in esteem. Among burgh pipers the family of Hasties were hereditary pipers of Jedburgh for upwards of 300 years; the last of them died at the beginning of the 19th century. The clan piper still takes a prominent part in Highland festivities, funerals, and other celebrations; and a piper forms one of the royal establishment at Balmoral. Pipers are attached to all the Highland regiments (see **BAND, MILITARY**), and bagpipe performances and contests form a feature at Highland gatherings, at home or abroad, when prizes are offered to the best players of pibrochs, reels, &c.

The Scottish burgh pipers, above alluded to, are supposed to have played on a variety of bagpipe called the Lowland pipe. It was smaller than the Highland pipe, and played with a bellows instead of by the mouth, otherwise, however, being exactly similar in principle; as was also the old form of the



Irish Bagpipe.

Northumbrian pipe. A newer form of the latter is still played. It is also a bellows instrument, and has several keys on the chanter, giving it a chromatic scale. A peculiarity of its fingering is that only one hole is uncovered at a time, and the end of the chanter is closed. The Irish bagpipe is a much more complete instrument than the Highland, as its chanter possesses a nearly full chromatic

scale with a compass from D below the stave to D above the stave. The drones, which are all fixed on one stock, also possess keys, which are played with the wrist of the right hand, giving an harmonious bass which is very effective in the hands of a good player. Some of the drones are of great length, winding as many as three times the length of the apparent tube. The general arrangement may be seen from the figure. The player is seated, with one side of the bellows tied firmly to his body, the other to his right arm; the bag under the left arm, the drones resting over his leg, and the end of the chanter resting on a pad of leather on the knee, on which it is 'tipped' for the purpose of articulating many of the notes. From the softness of the reeds used, the Irish pipe is a very sweet instrument, but its use is rapidly dying out. The Italian bagpipe, familiar in Britain through the wandering *pifferari*, is a very rude instrument, consisting of a goat's skin with an enormous drone, on which the player performs by means of a mouth-tube; another player playing the melody on a separate chanter.

Bagratidæ, an Armenian royal dynasty, ruling from the 9th to the 11th century. See ARMENIA.

Bagration, PETER IVANOVICH, PRINCE, a distinguished Russian general, descended from the royal family of the Bagratidæ of Georgia and Armenia, was born in 1765. He entered the Russian service in 1783, and was trained under Suvorof. In 1788 he was engaged at the storming of Okzakof; fought in 1792 and 1794 against the Poles; in 1799, in Italy and Switzerland; and distinguished himself in the Austro-Russian war of 1805 against the French, especially in the sanguinary engagement of November 16 of that year, when, with only 6000 troops, he bravely stood during six hours against a force of 30,000 under Murat. Subsequently, he was engaged in the battles of Austerlitz, Eylau, and Friedland, and took a part in the Russian campaign against the Turks, especially in the siege of Silistria, 1809. In the campaign of 1812 he commanded the second Russian army of the west, and had the misfortune to fail in his attack on Davout near Mohilov; but succeeded in forming a junction with the main army at Smolensk. He was, however, mortally wounded in the battle of Borodino (q.v.), and died October 7, 1812.

Bagshot Sands, a series of strata overlying the London clay; the name being derived from Bagshot Heath, near Windlesham, Surrey, where they were first examined. See Eocene.

Bahamas, or LUCAYOS (Span. *Los Cayos*), a chain of British West Indian islands, stretching nearly 600 miles in a north-westerly direction from the neighbourhood of the north coast of Hayti to that of the east coast of Florida. From Florida they are separated by the channel through which flows the Gulf Stream (q.v.); and from Cuba, by the Old Bahama Channel. These are the principal passages between the open ocean and the Gulf of Mexico. The chain extends in N. lat. from 21° 42' to 27° 34', and in W. long. from 72° 40' to 79° 5'; and it rests mainly on two shoals—the Great Bank to the south, and the Little Bank to the north. There are 20 larger islands, 653 islets or *cays*, and 2387 reefs. The chief members of the group, if reckoned from the NW., are these: Great Bahama, Abaco, Eleuthera, New Providence, Andros, Cat Island, San Salvador or Watling's Island, Xuma, Long Island, Crooked Island, Acklin, Mariguana, Inagua, Little Inagua. The Caicos (q.v.) and Turk's Island, which geographically belong to the Bahamas, have since 1848 been politically annexed to Jamaica.

The area is 5390 sq. m.; and in 1881 the popula-

tion was 43,521, of whom about 6500 are Europeans. Of coralline formation, the islands generally are of reef-like shape, long, narrow, and low, the highest hill not exceeding 230 feet. With very little appearance of soil, they derive considerable fertility from the tendency of the porous rock to retain moisture. Besides excellent pasturage, they yield Guinea-corn, maize, cotton, pine-apples, lemons, oranges, tamarinds, olives, pimento, cocoa-nuts, and a species of cinnamon. Sponges are largely found round the shores. Cotton cultivation received a great impulse during the American civil war. The sugar-cane, too, is grown more largely than formerly; but the salt manufacture has ceased to be remunerative. The temperature ranges from 57° to 113° F.; but in the winter the climate is so delightfully temperate as to be often prescribed in the United States for pulmonary complaints. The annual rainfall is from 43 to 45 inches, being heaviest from May to October, but pretty equally distributed over the other months. On 1st October 1866, and 8th September 1883, the Bahamas were visited by a furious and destructive cyclone.

The Bahamas were Columbus's earliest discovery (1492). But the precise spot of his first landing is still debated. Cat Island was generally believed to be the Guanahari or San Salvador of Columbus; but recent investigators transfer the honour to Watling's Island, situated a little farther to the east. The Bahamas, having been depopulated, but not again colonised by the Spaniards, were occupied by the English in 1629—to whom, after various vicissitudes of fortune in the wars with Spain and France, they were ultimately secured by the peace of Versailles (1763). Nassau, in New Providence, is the seat of government, and has recently been greatly improved both as town and port. During the American civil war, Nassau became the station for blockade-runners, and thence derived unexampled prosperity; the value of imports and exports rising from £234,029 and £157,350 in 1860, to £5,346,112 and £4,672,398 in 1864. They have greatly declined since; their present annual value, on a four years' average, being £192,710 and £136,310. So far, however, as agriculture is concerned, the impulse then received has been maintained by the Bahamas. Both Baptists and Wesleyans are nearly twice as numerous as members of the Church of England, which was disestablished in 1869; there are but few Presbyterians, and still fewer Catholics. The constitution consists of a governor, aided by an executive council of nine members, a legislative assembly of nine, and a representative assembly of twenty-nine. See BACOT'S *Bahamas* (2d ed. Lond. 1871).

Bahar. See BEHAR.

Bahawalpur, capital of an Indian native state in political connection with the Punjab, lies near the left bank of the Sutlej, which here is crossed by the fine 'Empress Bridge' of the Indus Valley Railway. It has a circuit of four miles—part, however, of the inclosed space being occupied by groves of trees. Bahawalpur has manufactures of scarfs and turbans, silks, chintzes and other cottons, and the immediate neighbourhood is remarkably fertile in grain, sugar, indigo, tobacco, and butter. Pop. (1881) 13,635. The surface of the state is remarkably level; but only about one-sixth, skirting the Sutlej and Indus, is capable of cultivation. From 1866 till 1879 the state was under British management, during the young Nawab's minority, and it prospered greatly, waste lands being cultivated, canals increased, the army organised, and the railway carried through a large section of the territory. The great majority of the inhabitants are Mohammedans. Area, 15,000 sq. m.; pop. (1881) 573,494.

Bah'ia, capital of the Brazilian province of the same name, next to Rio de Janeiro the largest city of the empire, on a range of hills stretching along the seashore. It is otherwise called São Salvador—the more usual term being taken from *Bahia de Todos os Santos*, or *Bay of All Saints*, on the east shore of which it is situated. The bay, which is one of the finest in America, is defended by forts, with the island of Itaparica (pop. 16,000) sheltering the entrance. It is built partly on the shore and partly on high ground; the lower town is dirty, with narrow paths. Street railways connect the city with its suburbs, and flights of steps and a hydraulic elevator aid the communication between the upper and lower town. Bahia has a university, an exchange, arsenal, and imperial dockyard, over sixty churches, and many public institutions; is the seat of an archbishop, who is primate of Brazil; and is the point of departure for a railway line to the interior. It is connected by submarine telegraph with Pernambuco, Para, and Rio. The value of imports and exports each exceeds £1,000,000 annually. The chief exports of Bahia are sugar, cotton, coffee, tobacco, rice, rum, dye-stuffs, fancy woods, cocoa-nuts, horns, hides, diamonds, and bullion; and it imports manufactured goods, provisions, flour, salt, iron, glass, and wines. Bahia is the oldest city in Brazil, and till 1763 was the capital of the colony. The bay was discovered by Amerigo Vespucci in 1503, and the city was founded by a Portuguese navigator named Correa in 1510. As a port, Bahia is unrivalled, and flags of all nations may be seen in the harbour. Unfortunately it is very unhealthy, and yellow fever and other epidemics find many victims here annually. Bahia contained, in 1883, 140,000 inhabitants, pretty equally divided between whites, blacks, and mulattoes.

BAHIA, a province of Brazil, about the middle of the coast, taking its name from its chief city. It extends in S. lat. from 10° to 16°, and in W. long. from 37° to 44°. Area 164,502 sq. m.; pop. (1883) 1,655,403. Its mineral deposits are in great measure lost for want of good roads, and have only been partially explored. The districts of Serra da Chapada and Serra da Sincora have been famous for diamonds since 1844. The Brazil wood found in its primeval forests equals that of Pernambuco; its cotton, tobacco, and rice are all of superior quality; and the province exports more sugar than all the rest of Brazil. The interior contains lofty and dry sierras; but the maritime districts are fertile, being well watered by the Itapicuru, Contas, and other rivers, and form the most thickly populated part of Brazil. Besides the streams that flow through Bahia, the San Francisco, a vastly larger river, forms about half of the inland boundary, dividing this province from that of Pernambuco.

Bahia Honda, a harbour on the north coast of Cuba, 60 miles WSW. of Havana, protected by a fort. Pop. about 1500. Copper and coal are worked in the neighbourhood, and the sulphur springs of Aguacate lie a short distance south.

Bahr, an Arabic word signifying a large body of water, is applied both to lakes and rivers. Bahr-el-Abiad (the White River), and Bahr-el-Azrak (the Blue River), are the chief branches of the Nile (q.v.).—Bahr-el-Ghazal is the name of the upper branch of the Nile, constituted by the Bahr-el-Arab and many other tributaries, which flows sluggishly eastward to join the Bahr-el-Jebel and so form the Bahr-el-Abiad. The Bahr-el-Ghazal gives name to a province of what was the Egyptian Sudan, bravely held for years by the governor, FRANK LUYTON (see LUYTON BEY'S paper in the *Proc. Geog. Soc.* for 1884).—Bahr-el-Yemen is the Red

Sea (q.v.), and Bahr-Lút (Sea of Lot) the Dead Sea (q.v.).

Bähr, JOHANN CHRISTIAN FELIX, classical scholar, was born at Darmstadt in 1798, and educated at Heidelberg gymnasium and university, of which last he became ordinary professor of Classical Philology in 1823. His chief work is his *Geschichte der römischen Litteratur* (1828; 4th ed. 1868-70), which is noted for its clearness and comprehensiveness. Three supplements to this work deal with the Christian Poets and Historians of Rome (1836), the Christian-Roman Theology (1837), and the History of Roman Literature in the Carolingian Period (1840). His edition of Herodotus (2d ed. 1855-61) is also noteworthy. He died 27th November 1872.

Bahraich, a town of Oudh, India, near the old bed of the Gogra, 70 miles NE. of Lucknow. It is an old town, with some local trade in piece goods and copper utensils. To the shrine of Masūd, a warrior and Mussulman saint, there is a great concourse of pilgrims annually in the month of May. Pop. (1881) 20,000. The area of the district of Bahraich is 2741 sq. m., and the population, 878,048.

Bahrdt, KARL FRIEDRICH, a German theologian and freethinker, was born in 1741 at Bischofswerda, in Saxony, and studied at Leipzig, where he became professor of Biblical Philology in 1766. Two years later he had to leave Leipzig for his immoral conduct. At Erfurt he was placed in the chair of Biblical Antiquities. Here he wrote two works whose heterodoxy involved him in controversies. In 1771 he was called to the chair of Theology at Giessen, and here also he preached with approbation for a few years, until he found it necessary to resign. Being inhibited from teaching by the government, he betook himself to Halle in 1779, and here he subsisted for ten years by keeping a public-house. Two political pamphlets brought him a year's imprisonment at Magdeburg, and gave him leisure to write the memoirs of his shifty life, published at Berlin in 1790. He died at Halle, April 23, 1792. His numerous theological writings are not of any value. See his Life by Leyser (2d ed. 1870).

Bahrein Islands, or AVAHL ISLANDS, a group of islands lying in the Persian Gulf. The most important of these is Bahrein (pop. 40,000), about 33 miles long and 10 broad. It is hilly in the centre, but the soil generally is fertile. Manama, the capital, has a good harbour. The Bahrein Islands are chiefly remarkable for their pearl-fisheries, which were known in ancient times, and which employ, during the season, from 1000 to 2000 boats, each manned with from 8 to 20 men. The annual value of the pearls is estimated at upwards of £300,000. The islands are inhabited by Arabs, and since 1861 have been under English protection. Pop. about 70,000.

Baiæ, a small town of antiquity, on the coast of Campania, 10 miles W. of Naples and opposite Puteoli, where the present castle of Baja stands. When the Roman empire was in its greatest splendour, the beauty of its situation, the fineness of the surrounding scenery, and the excellence of its mineral springs, made Baiæ such a favourite resort of the Roman nobles, that for want of space for their baths and villas they built out into the sea. Julius Caesar, Piso, Pompey, Marius, Julia Mamaea, and others, had country-houses at Baiæ. Horace preferred Baiæ to all other places in the world. The ruins, still standing on the desolate coast, or visible beneath the clear waters of the sea, are now the only evidence of the former magnificence of Baiæ. The ruins of three supposed temples, as well as the remains of a few *thermæ*, or warm

baths, still attract the attention of archaeologists. The harbour, one of the largest belonging to the Romans, is now small and poor. The surrounding country is covered with the ruins of Roman villas, sepulchral monuments, and other buildings.

Baikal (in Turkish, *Bei-kul*—i.e. 'rich lake') is, after the Caspian Sea and the Sea of Aral, the largest lake of Asia, with an area of some 13,500 sq. m. It is a fresh-water lake, and is situated in the south of Siberia, in the government of Irkutsk, in 51° 20' to 55° 30' N. lat., and 103° to 110° E. long., and somewhat resembles a sickle in shape. Its length is 330 miles, and its breadth 9½ to 40 miles; height above the sea, 1360 feet; mean depth 850 feet, but in some places as much as 4500 feet, more than 3000 feet below sea-level! The volume of water is calculated accordingly to be more than double that of Lake Michigan, which has a very much larger area. Its waters are a deep blue, and remarkably clear. The Baikal Mountains, a spur of the Altai, inclose the lake, which is fed by numerous streams, the chief of which are the Selenga and Barguzin. Its outlet is by the Lower Angara, a chief tributary of the Yenisei; but the river is inconsiderable in size compared with those which flow into the lake. It has several islands, the largest of which, Olkhon, has a length of 32 miles. There are numerous hot springs on its shores, and earthquakes are frequent. Formerly the lake seems to have been much more extensive; its level has fallen 20 feet within recent years (see *ASIA*). It is known that a subaqueous ridge divides Baikal into two great basins. The lake, which forms an important link in the chain of communication between Russia and China, has two commercial ports, and since 1846, steamboats have given a considerable impetus to its trade. The annual value of its fisheries is estimated at 200,000 roubles. Salmon and sturgeon are abundant, the former coming up the Yenisei from the Arctic Ocean, and large quantities of a fish resembling herring are also caught in it. It is one of the few lakes containing fresh-water seals, the capture of which employs most of the Russian settlers throughout the summer. A peculiar fish, called the golomyanka (*Callionymus baicalensis*), which is almost one mass of fat, yielding a mirable oil, was at one time found in immense numbers cast up on the beach after a storm, but it is now much scarcer. The surface of the lake is frozen from November to May, but the traffic is carried on over the ice. Besides the Russians in the town of Kuituk at the SW. end (with a harbour and lighthouse), the shores of Lake Baikal are also inhabited by tribes of the Buriats and Tunguses, who are now organised by the Russian government. See *ASIA*.

Baikie, WILLIAM BALFOUR, traveller, naturalist, and philologist, was born at Kirkwall, Orkney, 27th August 1825, and having studied medicine in Edinburgh, entered the royal navy as assistant-surgeon in 1848. He served in the Mediterranean, and from 1851 to 1854 acted as assistant-surgeon at Haslar Hospital. He was appointed surgeon and naturalist to the Niger expedition of 1854, and succeeding through the captain's death to the command of the *Plotin*, in his first voyage he penetrated 250 miles higher than any previous traveller; but in his second expedition of 1857 the *Plotin* was wrecked, and he was left by his fellow-explorers to continue his work alone. He founded a native settlement called Lukoja, at the junction of the Quorra and Benue, and within five years he had opened the navigation of the Niger, constructed roads, collected a native vocabulary, and translated parts of the Bible and Prayer-book into Haussa. He died while on leave of absence at Sierra Leone, 12th December

1864. The cathedral of St Magnus, Kirkwall, contains a monument to his memory. He published *List of Books and Manuscripts relating to Orkney* (Zetland, 1847); along with R. Heddle, *Historia Naturalis Orcadensis: Zoology* (Part I. 1848); and *Observations on the Haussa and Fulfulde Languages* (1861).

Bail, as generally understood, means the security given that a person charged with a crime or offence shall appear for trial, he obtaining liberation from prison in the meantime. The laws of England and Scotland differ on this subject. In England the committing magistrate may in all cases, except treason, admit to bail, and in nearly all of those minor offences, which are in England called misdemeanours as distinguished from felonies, he must admit to bail. In cases of treason, the Queen's Bench Division may admit to bail. The magistrate must judge of the sufficiency of the person tendered as bail, and must fix at his discretion the amount of bail to be paid if the accused fails to appear. If the accused seek to leave the country, the bail may have him apprehended. In Scotland, the law was that in capital cases (i.e. according to the old law of punishment serious theft being capital) the magistrate was not entitled to accept bail, but that in all other cases the accused had a right to bail, which by a statute of 1799 was fixed at certain amounts for the various classes of society; £300 for a burgess or householder, and £60 for an inferior person. This arrangement was, however, found to work badly, and by the Bail Act of 1888 the law was altered so that all crimes and offences except murder and treason became bailable; the fixing of the amount was given to the magistrate granting bail, an appeal to the High Court being allowed both to the applicant and to the public prosecutor. The application for bail must be disposed of within twenty-four hours, failing which the accused must be forthwith liberated. The right of the High Court and of the Lord Advocate to admit to bail was not affected by the act. When an accused person fails to appear, sentence of outlawry is pronounced, and the bail-bonds are forfeited. In civil procedure in England, bail is used also as the technical name of securities given for the release of an arrested ship, or the loosing of a foreign attachment, and in some other cases.

In the United States, the practice with regard to bail is very much the same as in England both in civil and criminal cases. Bail is admitted upon all arrests in criminal cases when this offence is not punishable with death; in cases of treason against the government it may be admitted in the discretion of the court. When the punishment is death, bail can be taken only by the supreme or circuit court, or by a judge of the district court of the United States. The bail on commercial contracts is not discharged by death; bail for appearance in court is discharged in that event. The enforcement of recognisance is generally similar to that under the common law.

Ballen, or BAYLEN, a town of Andalusia, Spain, 22 miles N. of Jaén. It has manufactures of glass, bricks, tiles, &c. Pop. 10,000. Here the Spaniards won their first and only victory over the French, 19th July 1808, when about 18,000 French soldiers laid down their arms.

Bailey, NATHAN or NATHANIEL, an early English lexicographer, whose work appeared in 1721 under the title, *An Universal Etymological English Dictionary*, to which a supplementary volume was added in 1727. In 1802 it had reached its thirtieth edition. An interleaved copy was the foundation of Johnson's more famous work. Lord Chatham is said to have read it through twice, and it

was one of the sources from which Chatterton drew his pseudo Old English words. In 1730 appeared the *Dictionarium Britannicum*, by several hands, under the supervision of Bailey. This busy author wrote several other books, now of but slight importance. Of his life very little is known, save that he was a 'Seventh-day Baptist' and kept a boarding-school at Stepney, where he died, June 27, 1742. The English Dialect Society reprinted, in 1883, the 18th-century dialect words preserved in Bailey's Dictionary.

Bailey, PHILIP JAMES, poet, was born at Basford, Nottingham, 22d April 1816, and after studying at Glasgow University, was called to the English bar in 1840, but never practised. *Festus*, the poem by which he is best known, was published in 1839, and reached an 11th edition in 1887, having in the course of these various editions received a large amount of new matter. It attracted considerable notice in England, and in America was hailed with a perfect tornado of applause. Before the enthusiasm had cooled, its author was in certain quarters mentioned in the same breath with Shakespeare, Milton, and Goethe. And by so great a poet as Rossetti it was, says his brother, under date 1843 'enormously relished, read again and yet again.' In 1850 appeared the *Angel World*, possessing on a reduced scale all the faults and beauties of the former work, with which it is now incorporated. Subsequent writings have been the *Mystic*, the *Age*, and the *Universal Hymn* (1867).

Bailey, SAMUEL, an industrious writer on political and mental philosophy, was born in 1791 in Sheffield, where afterwards he became a banker. He twice contested his native city as a 'philosophical radical' without success, and died there, after a remarkably busy but unusually quiet and uneventful life, January 18, 1870, leaving £80,000 as a bequest to the town. His first work was a really striking volume of *Essays on the Formation and Publication of Opinions* (1821), in which he ably defended the proposition that a man's opinions are independent of his will. His *Essays on the Pursuit of Truth and on the Progress of Knowledge* (1829) are only less valuable. His many controversial books on questions of political economy are already almost forgotten, though these, as well as his pamphlets and treatises on political representation, primogeniture, and the like, are characterised alike by terse exposition and vigorous style. Not less interesting but of less value, because to some extent the fruit of insufficient knowledge, are his *Review of Berkeley's Theory of Vision* (1842), *Theory of Reasoning* (1851), and *Letters on the Philosophy of the Human Mind* (1855-63). The third series of the last contains an able defence of utilitarianism, in which the author avows himself a thorough determinist. His conjectural emendations of the text of Shakespeare, published 1862-66, are of little value.

Bailey (probably derived from the middle Lat. *ballium*, frequently confused with *ballie*, 'the jurisdiction of a bailie or bailiff'—the whole space inclosed within the external walls of a castle, with the exception of that covered by the keep. This space was variously disposed of, and, of course, differed greatly in extent. Sometimes it consisted of several courts, which were divided from each other by embattled walls, so as to form a series of fortifications. When these courts were two in number, they were known as the outer and inner bailey. The entrance to the bailey was generally by a drawbridge over the ditch, and through a strong machicolated and embattled gate. It was often of great extent, containing the barracks for the soldiers, lodgings for workmen and artificers,

magazines, wells, chapels, and sometimes even a monastery. The word has survived in some proper names, as the *Old Bailey*, the seat of the Central Criminal Court in London, so called from the ancient *bailey* or *ballium* of the city wall between Ludgate and Newgate, within which it was situated. From the supposed license of vituperation supposed to characterise its proceedings, the well-known phrase 'Old Bailey style' has arisen. In Durham, also, the *bailey* is now a street, with the old name retained. The term is also applied to the outer wall or first line of defence, as well as generally to any of the circuits of walls which surrounded the keep.

Bailie, a Scottish term, with several legal applications, but originally a mere doublet of *bailiff*. It popularly signifies a superior officer or magistrate of a municipal corporation in Scotland, with judicial and administrative authority within the city or burgh. The civil and criminal jurisdiction of the Burgh Court, however, is not extensive. In royal burghs, the office is in some respects analogous to that of Alderman in England. The chief magistrate of a Scots corporation, called the *Provost* (q.v.), and often one or more of the bailies, are, in virtue of their office, in the commission of the peace; and bailies are exempted from serving on juries. There are also *Bailies of Regality* and *Barony*, who are appointed by the *Superior* or over-lord of the Manor (q.v.), with limited powers fixed by the Heritable Jurisdictions Act, 1747. There were also bailies of the four bailleries—viz. Carrick, Kyle Stewart, Cunningham, and Lauderdale. There is a bailie for the Sanctuary or Abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper, and having jurisdiction within the precincts (see SANCTUARY). The word *Bailie* was also formerly a term in the practice of Scots conveyancing, and signified an officer who represented the seller, and who, as such, gave *seisin* or *Sasine* (q.v.), or delivery of the lands sold to the buyer or his attorney, the sheriff being bailie in crown land; but by the changes and simplifications effected by recent legislation, the office of bailie in this sense has been abolished.

Bailiff (Scotch *bailie*, Fr. *bailli*, Ital. *balio*: all from late Lat. *bagulus*, an adj. from *bagulus*, 'a carrier,' then 'a manager'), an officer with public authority in a certain district. In England it was applied formerly to the king's officers generally, and it is still the formal title of the chief-magistrate of certain towns, as the 'Bailiff of Dover Castle.' The name *bagulus* was given at the Greek imperial court in Constantinople to the chief tutor of the imperial children, afterwards to the Venetian superintendent of the foreign merchants there, and in the form *Balio* to the Venetian ambassadors themselves. The title *Balliens* was introduced by the Knights of St John into the south and west of Europe, as the eight members of their chapter were called *Ballivi conventuales*. In England the name was introduced after the conquest, and applied loosely to several officials; thus the sheriff was spoken of as the 'king's bailiff,' his shirevalty as his 'bailiwick.' Later, the word became applied to elective functionaries, but gradually to definite offices, as the presiding magistrate of a town the English reeve, but unlike that officer, nominated by the overlord instead of the citizens—as the bailiff of Beverley, by the Archbishop of York. By the end of the 13th century, the Mayor had supplanted the bailiff almost everywhere.

BAILIFF, in English law, is a legal officer, and may be described as the keeper, protector, or superintendent of some duty or charge legally imposed on him. As officers of the law, bailiffs put in force

arresting process, and they perform other duties within the county or bailiwick required of them by the sheriff, who is their immediate official superior. In this sense bailiffs are either *bailiffs of hundreds or bound bailiffs*. The duty of the former is to collect fines, summon juries, attend the judges and justices at the assizes and quarter-sessions, and execute writs and processes in the several hundreds. *Bound bailiffs*, again, are officers usually joined by the sheriffs with the bailiffs of hundreds, and employed on account of their adroitness and dexterity. They are called bound bailiffs because, the sheriff being civilly responsible for their official misdoings, they are annually bound in an obligation, with sureties, for the due execution of their office. There are also *special bailiffs*, who are officers appointed by the sheriff on the application of the party suing out the process to be executed; and whenever a party thus chooses his own officers, he is considered to discharge the sheriff from all responsibility for what is done by him. There is, besides, another exceptional class of bailiffs, called bailiffs of *liberties*, honours, manors, and other lordships and franchises, whose appointments, duties, and responsibilities are regulated by the 7 Vict. chap. 19. The *high bailiff* of a county court is a permanent officer under whose directions the process of the court is executed by sub-bailiffs. The office of high bailiff is usually combined with that of the registrar.

The sheriff himself is the *Queen's bailiff*, and, as such, it is his business to preserve the rights of the crown within his bailiwick. He must seize to the sovereign's use all lands devolved to the crown by attainder or escheat; must levy all fines and forfeitures; and must seize and keep all Waifs (i.e., wrecks, estrays, and the like, unless they be granted to some subject.

In the United States, the term bailiff is seldom used except sometimes to designate a sheriff's deputy or constable, or a party liable to account to another for the rents and profits of real estate; as in some cases a tenant in common who receives more than his share. The duties of a bailiff are performed in America by a deputy sheriff, constable, or tipstaff, who are officers acting under the orders of the sheriff or magistrate, or under the immediate supervision of the court.

Bailiwick legally means the county or district within which the sheriff, as bailiff of the king, may exercise jurisdiction. It is often applied by English writers to foreign towns or districts under a *royal or bailli*.

Baillet, a town in the French department of the Nord, 19 miles NW. of Lille. It has manufactures of beer, leather, lace, linen, and soap, and a brisk trade in corn and cheese. The Baili family hence derived its name. Pop. 8180.

Baillie, LADY GRIZEL, born in 1665, was the daughter of the Scottish patriot, Sir Patrick Hume, afterwards first Earl of Marchmont, and in 1684 supplied him with food during his concealment in the vault beneath Polwarth church. She shared her parent's exile at Utrecht (1686-88), and in 1692 married the son of Baillie of Jerviswood. He died in 1738, and she on 6th December 1746. She is remembered by her songs, the best of which is, 'And werena my heart light I wad dee'; and also by Memoirs of her (1822), by her daughter, Lady Grizel Murray of Stanhope (1663-1759).

Baillie, JOANNA, poetess, was born in Bothwell manse, in Lanarkshire, 11th September 1762. Her father, a Presbyterian minister, in 1776 became professor of Divinity in Glasgow; her mother was the sister of William and John Hunter. She received a superior education, and soon began to manifest those talents which subsequently excited

the admiration of the public. Her career was a singularly happy one, but devoid of all striking incident. In 1784 she went to reside in London, where her brother, Matthew Baillie, had established himself as a physician. In 1806 she and her sister took a house for themselves at Hampstead, and here she remained till her death, which occurred on the 23d of February 1851, when she had attained the venerable age of 88. Agnes, her sister, survived till 1861, being then a hundred years old. No authoress ever enjoyed a larger share than Joanna Baillie of the esteem and affection of her literary contemporaries. All vied in showing her a courteous respect, and even America sent its votaries to her little shrine at Hampstead. Her greatest achievement is undoubtedly the nine *Plays on the Passions* (1798-1836), which, though erroneous in conception, are full of noble and impressive poetry, and often characterised by intense dramatic power. The principle upon which Miss Baillie proceeded in the construction of these plays, was, like Marlowe and George Meredith, to take a single passion as the subject of a work, and to exhibit its influence on an individual supposed to be actuated by nothing else. In spite of this method of treatment, there are scenes, in her tragedies especially, where the interest of the reader is intensely excited by the great art shown in the minute delineation of a particular passion, and where he is forced to forget the artificial theory of the author. The most popular as well as the most powerful of her works is the tragedy of *Dr Monfort*. It was brought out at Drury Lane in 1800, Kemble and Mrs Siddons taking the leading parts. Her *Family Legend*, produced at Edinburgh under Scott's auspices in 1810, was a great success. Many of Miss Baillie's minor pieces are very sweet, simple, and beautiful; and are marked by a sprightly grace of versification, and a playful serenity of spirit, which pleasantly remind one of the author's personal character. She was under the middle size, but not diminutive; her form was slender, and her countenance showed high talent, worth, and decision. See Miss Thackeray's *Book of Sibyls* (1883).

Baillie, MATTHEW, anatomist, brother of the above, was born in Shotts manse in 1761. His mother was a sister of the two celebrated anatomists, William and John Hunter; and Matthew, after seven years at Glasgow and Oxford (1773-80), studied anatomy under his uncle William, with such success, that in 1783 he was found qualified to succeed to his practice and lectureship. Working often sixteen hours a day, he made a very large income—one year, £10,000—so that he purchased the estate of Duntisborne in Gloucestershire, and at his death there, on 23d September 1823, left a fortune besides of £80,000. His works, with a *Life* by Wardrop, appeared in 2 vols. in 1825. The most important is on *Morbid Anatomy*, published in 1795.

Baillie, ROBERT, Presbyterian divine, was born at Glasgow in 1599, and educated at the university of that city. In 1622 he received episcopal ordination, and was shortly after presented to the parish church of Kilwinning. In 1637 he refused to preach in favour of Laud's service book; and in 1638 he sat in that famous General Assembly which met in Glasgow to protest against the thrusting of Episcopacy on an unwilling people, but conducted himself with greater prudence and temperance than was quite agreeable to his excited brethren. However, he soon threw himself eagerly into the national cause, and served as a chaplain in the Covenanting army at Duns Law (1639). In 1640 he was selected by the Scottish leaders to go to London, with other commissioners, and draw up charges against Archbishop Laud. On his return to Scotland in 1642,

he was appointed joint-professor of Divinity at Glasgow, along with Mr David Dickson. In 1643 he was again sent to London as a delegate to the Westminster Assembly of Divines, where he conducted himself in an unobtrusive manner, but cordially concurred in the doctrines which were drawn up. It is curious to notice that, though he had himself experienced the injustice of intolerance, he yet, like almost every other theologian of his age, vehemently discarded the principle of toleration, and asserted the divine right of Presbytery with no less emphasis than Laud did that of Episcopacy. In 1649 he was chosen by the church to proceed to Holland, and to invite Charles II. to accept the Covenant and crown of Scotland. He performed his mission skilfully; and, after the Restoration, through Lauderdale's influence, he was made Principal of Glasgow University. He died July 1662. His pamphlets and larger works, fourteen in number, are, well-nigh forgotten; but his *Letters and Journals*, edited by David Laing for the Bannatyne Club (3 vols. 1841-42), are a valuable contribution to our knowledge of the times.

Baillie, ROBERT, of Jerviswood, the 'Scottish Sidney,' was a native of Lanarkshire, who first came into notice in 1676 through his rescue of a brother-in-law, the Rev. Mr Kirkton, from the clutches of Archbishop Sharp's principal informer. For this he was fined 6000 merks (£318), and, refusing to pay, was sent to prison; but so strong was the indignation of the Scottish gentry, that he was released at the end of four months, on payment of half the fine. In 1683 he took a prominent part in a scheme of emigration to South Carolina, as he saw no other refuge from the degrading tyranny of the government. About the same time, however, he entered into correspondence with the heads of Monmouth's supporters in London, Russell and Sidney, and subsequently repaired there to concert measures for securing adequate reforms. On the discovery of the Rye-house Plot, he was arrested and sent down to Scotland. Accused of conspiring against the king's life, and of hostility to monarchical government, he was tried at Edinburgh, and condemned to death upon evidence at once insignificant and illegal. His bearing, both on his trial and during his imprisonment, was such that his cousin, Bishop Burnet, declared 'it looked like a reviving of the spirit of the noblest of the old Greeks or Romans, or rather of the primitive Christians and martyrs.' The barbarous sentence for high treason was carried into execution on the very day that it was passed, 24th December 1684.

Baillly, JEAN SYLVAIN, a famous French astronomer, President of the National Assembly of 1789, and Mayor of Paris, was born in that city, September 15, 1736. From art he turned aside to literature, but was fortunately induced by Lacaille to study astronomy, which proved to be the true sphere of his genius. He was early admitted to the Académie des Sciences, and he justified his honours by a succession of learned and elegantly written treatises on astronomical subjects, which culminated with his great *Histoire de l'Astronomie* (5 vols. 1775-87). Elected to the Académie Française, and next year to the Académie des Inscriptions, he was thus a member of the three academies at once, an honour that had fallen to no one before him save Fontenelle. The revolution interrupted his peaceful studies. Elected President of the National Assembly, June 17, 1789, and Mayor of Paris on the 15th of July, he conducted himself in these capacities with great integrity and purity of purpose; but at last lost his popularity by allowing the National Guard to fire on the masses who were assembled in the Champ de Mars, on the 17th of July 1791, to demand the dethronement of the

king. He now threw up his mayoralty, withdrew altogether from public affairs, and went to live first at Nantes, and afterwards with his friend Laplace at Melun. Here he was seized by the Jacobin soldiery, and brought to Paris, where he was accused of being a royalist conspirator, condemned and executed with the usual Jacobin preliminary of savage insult, November 11, 1793. From his papers were published his *Essai sur l'Origine des Fables et des Religions Anciennes* (2 vols. 1799), and his *Mémoires d'un Témoin de la Révolution* (3 vols. 1804). See Nonnrisson, *Trois Révolutionnaires: Turgot, Necker, Baillly* (1885).

Bailment, in English law, means the delivery of goods in trust for some special purpose, on a contract, express or implied, to conform to the purpose of the trust. Deposits, pledges, or pawns, contracts for hiring goods, and gratuitous loans, are all varieties of bailment. In the United States the same definition applies. Practically, bailments are of three kinds: (1) for the benefit of the bailor or his representative; (2) for the benefit of the bailee or his representative; (3) for the benefit of both parties. In the first case, as when a person receives the goods of another to keep without recompense, he is responsible only for gross neglect; in the second, he is responsible for the slightest neglect; in the third case, the bailee is bound only to ordinary care and diligence. Bailees, such as warehousemen, innkeepers, and common carriers, have a lien on the property bailed for their charges.

Baily, EDWARD HODGES, sculptor, was born at Bristol, 10th March 1788. Two Homeric studies which he had executed were praised by Flaxman; and in 1807 he went to London, saw Flaxman, and entered his studio. He won several medals; but his 'Eve at the Fountain' (1818) first established his reputation. George IV. employed him, along with other artists, to execute the sculpture in front of Buckingham Palace, the figures on the Marble Arch, and the 'Triumph of Britannia.' Besides these, Baily executed a great number of busts and statues—Wellington, Byron, Telford, Earl Grey, and Sir Astley Cooper. The statue of Nelson, in Trafalgar Square, is likewise his, as also those of Charles James Fox and Lord Mansfield in St Stephen's Hall, Westminster. His 'Eve listening to the Voice,' 'Sleeping Nymph,' 'Girl preparing for the Bath,' and 'The Graces Seated,' are among his finest efforts. He died 22d May 1867.

Baily, FRANCIS, astronomer, was born at Newbury, Berks, 28th April 1774. An apprenticeship in a London mercantile house was followed by a few years of roving, but at the age of 25 he settled down as a stockbroker in London. In financial business he showed great capacity, and he gradually acquired a large fortune. Meantime he published a series of excellent books on questions involved in banking and assurance. At 51 he retired from business to devote himself entirely to astronomy. Scientific honours were soon showered upon him both from home and abroad. Among the chief of the services rendered to his chosen subject through his unwearying industry, were his share in the foundation of the Astronomical Society, and in the improvement of the *Nautical Almanac*, his laborious repetition of Cavendish's experiment to measure the density of the earth (see EARTH), and the production of the Astronomical Society's Star-catalogue. The latter, says his biographer, Sir J. Herschel, 'put the astronomical world in possession of a power which may be said, without exaggeration, to have changed the face of sidereal astronomy.' Baily's writings, ninety-one in number, included a *Life of Flamsteed* (1835), but

mostly appeared in the *Astronomical Society's Memoirs*. He died in London, 30th August 1844.

Baily's Beads, the name given to a phenomenon in connection with eclipses of the sun, first fully described by Francis Baily. Just before the beginning and after the end of the obscuration by the moon of the sun's disc, the thin crescent-shaped unobscured portion of the sun seems usually to become suddenly discontinuous, and looks like a belt of bright points, varying in size and separated by dark spaces. The resulting appearance has been compared to a string of beads. The phenomenon is an effect of irradiation and the inequalities of the moon's edge. To irradiation it is also due that, by defect of the retina of the eye, bright objects seen on a dark ground seem larger than they really are.

Bain, ALEXANDER, writer on mental philosophy, was born at Aberdeen in 1818. Educated at the university of his native city, he lectured there as deputy-professor for a few years, afterwards taught Natural Philosophy at the Andersonian University, Glasgow, filled the office of assistant-secretary to the Metropolitan Sanitary Committee and the Board of Health, examined in mental philosophy for the university of London and the Indian Civil Service, and was appointed in 1860 to the chair of Logic in Aberdeen. He resigned in 1881, and the same year was elected Rector of his university. In 1859 he was made LL.D. by the Edinburgh University. Bain's chief works are *The Senses and the Intellect* (1855), and *The Emotions and the Will* (1859), completing a systematic exposition of the phenomena of the human mind. Other books are *Mental and Moral Science, a Compendium of Psychology and Ethics* (1868); *Logic, Deductive and Inductive* (1870); *The Relation of Mind and Body* (1873); *Education as a Science* (1879). He wrote also a biography of James Mill (1881), as well as a criticism of John Stuart Mill (1882), besides several handbooks of English grammar; he assisted in editing Grote's *Aristotle*, and edited Grote's *Minor Works*. In philosophy, Bain is a conspicuous representative of the empirical or experimental school, in opposition to the *a priori*, or transcendental. His psychology is based on physiology, after the manner of Hartley's; but instead of considering the human organism as capable only of receiving impressions and of acting in response thereto, he finds in it a power of originating active impulses (Spontaneity), and thus obviates many of the defects alleged by *a priori* philosophers to inhere in the system of sensationalism, as hitherto exhibited. His two chief works were pronounced by J. S. Mill to be the most careful, the most complete, and the most genuinely analytical exposition of the human mind which *a posteriori* psychology had produced. See ASSOCIATION OF IDEAS.

Baini, GIUSEPPE, musician, was born at Rome in 1775, and was director of the pope's choir from 1814 till his death in 1844. The severe gravity and profound science of his compositions contrasted strongly with the careless style and shallow dilettanteism of most of his contemporaries; but less by his compositions than by his historical researches did Baini secure for himself a prominent place in musical literature. His principal work is his *Life of Palestrina* (1828).

Bairaktar (more correctly, Bairaktar), signifying 'standard-bearer,' is the title of the energetic Grand-vizier Mustapha. Born in 1755, of poor parents, he entered the military service at an early age, and soon distinguished himself by his valour. When he was pasha at Rustchuk in 1806, he fought with some success against the Russians, and after the revolt of the janissaries in 1807, by

which Selim III. (q.v.) was deposed from the throne in favour of Mustapha IV., Bairaktar marched his troops to Constantinople, where they found the dead body of Selim lying in the first court of the seraglio. Bairaktar executed all those who had had any share in the murder, deposed Mustapha IV., and proclaimed the brother of this prince, Mahmud II., sultan on the 28th July 1808. Bairaktar was now appointed grand-vizier, and endeavoured to carry out Selim's reforms, and to strengthen the regular army. His chief object was the annihilation of the janissaries; but, favoured by the fanatical people, these praetorians rebelled, and, with the support of the fleet, attacked the seraglio on the 15th November 1808, and demanded the restoration of Mustapha IV. Bairaktar defended himself bravely; but when he saw that the flames threatened to destroy the palace, and that he was in danger of falling alive into his enemies' hands, he strangled Mustapha, threw his head to the besiegers, and then blew himself up.

Bairam, the Persian and Turkish name for a Mohammedan festival somewhat analogous to Easter. It commences immediately after the fast of Ramadan, or Ramazan, which corresponds in its abstinence to Lent. Being one of the two great feasts of the Moslems, it is looked forward to with great interest, the zest being enhanced by the previous abstinence. Properly, it should terminate in one day, but the festivities are generally protracted over three days. Seventy days after, the Moslems celebrate the second Bairam ('the festival of the sacrifices'), instituted in commemoration of the offering up of Isaac by Abraham, and on which all the faithful of Islam must sacrifice victims. The second Bairam usually lasts four days. The Mohammedan year being the lunar one of 354 days, in the course of thirty-three years the festivals run through all the seasons. In 1887 the first Bairam fell on the 23d June.

Baird, SIR DAVID, Bart., British general, was born 6th December 1757, at Newbyth, Haddingtonshire. He entered the service in 1772, and in 1779 sailed to India as captain in a Highland regiment. He was soon in the midst of a sanguinary war. In July 1780, Hyder Ali burst into the Carnatic at the head of 100,000 men, disciplined and commanded by French officers. A portion of the English army fell into an ambuscade and was cut to pieces. Among the few who remained alive to be taken prisoners was Baird. He was thrown into a dungeon at Seringapatam, where he endured a captivity of nearly four years. In March 1784 he was released, and after a two years' visit to England (1789-91), he took part in several important sieges, attacks, and skirmishes; till in 1799, now a major-general, he memorably signalled himself at the victorious assault of Seringapatam. He led the storming-party, Colonel Wellesley (afterwards Duke of Wellington) commanding the reserve. Baird indignantly complained when Wellesley received the appointment of governor of Seringapatam, which he felt was due to his own services. He commanded an expedition sent to Egypt in 1801 for the expulsion of the French. On his return to India in 1802, he found that the star of Wellesley was in the ascendant; and Baird applied for leave of absence. He was received at court with great distinction, knighted in June 1804, and made a K.C.B. in the following August. In 1805 he commanded an expedition against the Dutch settlements at the Cape of Good Hope. In 1807 he commanded a division at the siege of Copenhagen; and in 1808 was sent to Spain with an army of 10,000 men, to assist Sir John Moore. He distinguished himself in the battle of Corunna, January 16, 1809, when his left arm was shattered by grape-shot, and

had to be amputated. On the death of Moore, he succeeded to the command. On this occasion he received, for the fourth time in his life, the thanks of parliament, and was created a baronet. He retired from active service in 1810, and in 1820 was made commander of the forces in Ireland. He died at Fern-Tower, Criccieth, August 18, 1829. See his *Life* by Theodore Hook (2 vols. 1832).

Baird. JAMES, ironmaster, was born at Kirkwood, Lanarkshire, 5th December 1802. The fourth son of Alexander Baird, a coal-master, he was educated at Old Monkland, and was for a short time at Glasgow University. In 1826 he was associated with his father and two brothers, William and Alexander, in the leasing of coal fields at Gartsherrie and elsewhere. Blast-furnaces were added in 1830, and James Baird assumed the active management. Between 1842 and 1861 the blast-furnaces at Gartsherrie, Eglinton, Muirkirk, and elsewhere increased from sixteen to between forty and fifty, capable of turning out 300,000 tons of iron annually, and employing 10,000 men and boys. As the firm increased in wealth, estates to the value of £2,000,000 were acquired by the brothers. James Baird represented the Falkirk burghs in 1851-52 and in 1852-57. In later years he built and endowed various schools, founded the 'Baird Lectures' for the defence of orthodox theology in Scotland in 1871, and in 1873 gifted to the Church of Scotland a sum of £500,000, 'to assist in providing the means of meeting, or at least as far as possible promoting the mitigation of, spiritual destitution among the people of Scotland.' He died at his seat of Cambusdoon, near Ayr, 20th June 1876. He was twice married, but left no family. His property was valued at £3,000,000. See Baird's *Bairds of Auchmolden* (1870).

Baird, SPENCER FULLERTON, LL.D., an American naturalist, was born at Reading, Pennsylvania, 23d February 1823. He was educated at Dickinson College, Carlisle, and became professor of Natural Science there in 1846. In 1850 he was elected assistant-secretary of the Smithsonian Institution at Washington, and in 1878 secretary. He translated from the German and edited the *Iconographic Encyclopedia*; and published Reports on the collections in natural history made by Stansbury, Gilliss, Marcy, and others in the government explorations. In connection with John Cassin, he published *The Birds of North America* (2 vols. 1860), and *The Mammals of North America* (1859); and with Dr Brewer and Professor Ridgway, *History of the Birds of North America* (5 vols. 1870-84). Dr Baird published numerous other papers upon mammals, birds, reptiles, and fishes. In 1871 he was appointed by the president United States Commissioner of Fish and Fisheries, and in that capacity he has accomplished much towards the advancement of fisheries and fish-culture, accounts of the results of this work being embodied in annual Reports. His especial work, while assistant-secretary of the Smithsonian Institution, was the development of the National Museum, which made its beginning under his direction in 1850. A bibliography of his publications, with a biographical sketch, constitutes Bulletin No. 20 of the National Museum. He died 19th August 1887.

Baireuth, or BAYREUTH, capital of the Bavarian province of Upper Franconia, 43 miles NNE. of Nuremberg by rail. Beautifully situated on the Red Main, it has broad well-paved streets, interspersed with groves, promenades, fine gardens, and public fountains. Its principal buildings are the old palace, dating from 1434; the new palace (1753), containing a gallery of paintings; and the old opera-house (1748). A magnificent

'national theatre' for the performance of Wagner's music, finished in 1875, was in the following year opened with a grand representation of his Nibelungen trilogy. On 14th February 1883, the great master (who died at Venice) was buried in the garden of his villa here. Baireuth's chief articles of industry are cottons, woollens, linen, leather, tobacco, parchment, and porcelain. An active trade is also carried on in grain and horses. Jean Paul Richter died here in 1825, and a monument has been erected to his memory. Pop. (1871) 17,841; (1885) 23,531; of whom only 15 per cent. are Catholics. See R. Milner-Barry's *Baireuth and the Franconian Switzerland* (1887).—The witty and accomplished Wilhelmina, Margravine of Baireuth (1709-58), was the favourite sister of Frederick the Great, and in 1731 was married to Frederick, Margrave of Baireuth. Her *Memoirs*, first published in 1810, were translated into English by the Princess Christian in 1887.

Baitul, or BETUL, a town of British India, in the Central Province, 50 miles NE. of Ellichpur. Pop. over 4700. Baitul district, whose headquarters is Badnur, 4 miles off, is a highland region, rich in coal. Area, 3904 sq. m.; pop. (1881) 304,905.

Baize (old Fr. *baies*), a coarse woollen cloth with a long nap, used mainly for coverings, curtains, linings, but in some countries for clothing.

Baja, a market-town of Hungary, on the Danube, 90 miles S. of Pesth. It is celebrated for its annual swine-fair, and its trade in grain and wine. Pop. (1880) 19,241.

Bajan. See BEJAN.

Bajazet I. or BAJAZID, Sultan of the Turks, was born in 1347, and in 1389 succeeded his father, Murad I., who was slain on the battle-field of Kosovo. He inaugurated his rule by strangling his younger brother Yakub, lest he should dispute the succession. In three years he conquered Bulgaria, with parts of Serbia, Macedonia, and Thessaly; he also subdued the greater part of Asia Minor. From the rapidity with which these extraordinary conquests were effected, he received the name of Ilderim—that is, 'Lightning.' He even blockaded Constantinople itself for ten years, thinking to subdue it by famine. To rescue this city, King Sigismund of Hungary (afterwards emperor of Germany) assembled a large army, including 2000 French nobles, and laid siege to the Bulgarian city of Nikopolis, on the Danube. Bajazet hastened to meet him, and gained a decisive victory over the allied Hungarians, Poles, and French (1396). Sigismund escaped, but the greater part of the French, through whose impetuosity the battle was lost, were taken prisoners, and were nearly all executed. Bajazet would now have entirely destroyed the Greek empire, if he had not been prevented by Timur (q.v.), who attacked his possessions in Asia Minor, and completely defeated him (1402) near Angora. Bajazet himself fell into the hands of the conqueror, who treated him with great generosity. The story popularised by Marlowe and Racine, that he was carried about imprisoned in a cage, is without historical foundation, and is probably based on a mistranslation of a Turkish word signifying 'litter.' Bajazet died in 1403, in the camp of Timur. He was succeeded in the government by his son Soliman I. Bajazet was honourably distinguished by his efforts to improve the administration of justice.

Bajazet II. son of the Sultan Mohammed II., the conqueror of Constantinople, was born in 1447, and ascended the Ottoman throne after his father's death in 1481. His reign, which lasted 32 years, was a succession of uninterrupted wars against

Hungary, Poland, Venice, Egypt, and Persia, which were carried on with various success, and which served on the whole to establish the Ottoman power. The submission Bajazet always showed to the wishes of the Janissaries (q.v.) laid the foundation of the later importance of that body. The last years of his reign were much disturbed by disputes between his three sons about the succession to the throne. Influenced by the preference shown by the janissaries for his youngest son Selim, Bajazet abdicated in his favour, but died before he could reach the place of his voluntary exile, in the neighbourhood of Adrianople, in the year 1512. Bajazet was a friend to the dervishes, at the same time liberal and fond of pomp and splendour. Many of the most beautiful mosques in the Ottoman empire were built by him.

Bajimont. See BAGIMONT.

Bajmok, a large village of Hungary, in the province of Baes, 16 miles SW. of Theresienstadt. Pop. (1881) 6661.

Bajocco, or BAIUCCO (pl. BAIUCCHI), was a copper coin in the Papal States, value nearly a halfpenny. It was 1-100th of the scudo, which was equal to 4s. 3½d.

Bajus, MICHAEL (properly, De Bay), a great Catholic theologian in the 16th century, was born in 1513 in Hainault. He studied at Louvain, became professor of Theology there in 1551, and went as a deputy to the Council of Trent in 1563. He was a devoted student of St Augustine, and his theology was based on that father's views of divine grace, of sin, and of the absence of merit in all good works. His assertion of the inability of the human will, left to its own freedom, to do anything but sin, with his application thereof to the dogma of the immaculate conception, soon drew on him the accusation of heresy. Seventy-six of his propositions were condemned by a papal bull in 1567. He submitted, but was supported by his university, which appointed him its chancellor in 1578. Meantime he maintained a long controversy with the Jesuits, and in 1587 denounced thirty-four of their theses as Pelagian and immoral. He died December 16, 1589. He may be regarded as the predecessor of the Jansenists. See Linsebaum, *Michael Bajus* (Tab. 1867).

Bajza, JOSEPH, a Hungarian poet and prose-writer, was born January 31, 1804, at Szécs, in Heves. After his studies at Pesth, he practised there as an advocate, and early gained by his first volumes of verse, published in 1835, a place among the best Hungarian lyric poets. As a contributor to the critical journals, and as editor of the *Független* (Observer) from 1837-43, he exercised a beneficial influence on the rising literature of Hungary. He translated a collection of foreign dramas (1830); and published an *Historical Library* (from the German) in 6 vols., a *Modern Plutarch*, and a *Universal History*. He died at Pesth, 4th March 1858.

Bakacs, THOMAS, Hungarian statesman, was the son of a peasant, born about the middle of the 15th century. He held several bishoprics in succession, became chancellor of the kingdom, and finally archbishop and cardinal. He preached a crusade against the Turks; but his army of peasants and vagabonds turned their arms against the nobility, and a bloody civil war ensued. He died in 1521, leaving enormous wealth.

Bakalahari, the name of a Bechuana tribe resident in the Kalahari desert, between the Orange River in the south and Lake Ngami in the north, in Africa. They show some disposition for settled life and industrial pursuits, cultivating the soil, and rearing goats.

Bakarganj, a British district in the Dacca division of India, under the lieutenant-governor of Bengal, contains 3649 sq. m. It is fertile, and is watered at once by the lower streams of the Ganges and the Brahmaputra. In the south of the district are the forest tracts of the Sunderbunds. Barisal, the headquarters, on the west bank of Barisal River, is the only town with more than 5000 inhabitants. Bakarganj, the former capital, situated near the junction of the Krishnakanai and Khairabad rivers, is now in ruins. Pop. (1881) 1,900,889.

Bakau, a Roumanian town, on the river Bistritza, 187 miles N. of Bucharest by rail. Pop. 13,000.

Bakchiserai (Turkish, 'Garden Palace'), a town in the Russian government of Taurida, the residence of the ancient princes or khans of the Crimea, stands in a deep limestone valley, 15 miles by rail SW. of the present capital, Simferopol. Pop. (1881) 13,377, mainly remnants of the old Tartar inhabitants. The palace (1519) of the khans has been completely restored by the Russian government in the oriental style.

Bake, JAM, a distinguished classical scholar, was born at Leyden in 1787; from 1817 to 1857 was professor of Greek and Roman literature in the university there, and died 26th March 1864. He edited works by Cicero, Longinus, and others; and wrote many admirable critical papers.

Bakel, a town with a strong fort, in the E. of the French colony of Senegal, on the left bank of the Senegal River. Pop. 2600.

Baker, MOUNT, an active volcano in the NW. of Washington Territory, U.S., in the Cascade Range, a continuation of the Rocky Mountains, 20 miles from the Canadian frontier. It is in eruption from time to time, and was very active in 1880. Its height is 11,100 feet.

Baker, HENRY, naturalist, born in London in 1698, from a bookseller's apprentice turned a teacher of deaf-mutes, and, making a largish fortune, in 1729 married Defoe's youngest daughter. In 1740 he was elected a Fellow both of the Royal Society and of the Society of Antiquaries. He contributed many papers to the Transactions of the former society, received its Copley gold medal (1744) for his microscopical experiments, and published a philosophical poem on the *Universe*. He was founder of the Bakerian lectureship, and died 25th November 1774.

Baker, JOHN GILBERT, botanist, was born at Gainsborough, York-shire, 13th January 1834, and in 1866 was appointed assistant curator at the herbarium at Kew. He was for many years lecturer on botany to the London hospital, and in 1882 he received a like appointment from the Apothecaries' Company; he is also a member of the Royal and Linnean Societies. His voluminous writings include works on the flora of districts so diverse as the north of England, Madagascar, and Brazil; and from his pen have come both popular monographs and scientific catalogues of high value.

Baker, SIR RICHARD, author of the *Chronicle of the Kings of England*, a work without which no country gentleman's library was complete, and often referred to by 'Sir Roger de Coverley.' Notwithstanding its reputation, however, the book had no lack of errors, and now is all but forgotten. Its author, born in Kent about the year 1568, was educated at Oxford University, and was knighted in 1603. In 1620 he was high-sheriff of Oxfordshire; but in 1635 he was thrown into the Fleet Prison for debt which his wife's family had contracted, but for which he had become responsible. Here he wrote his *Chronicle*, first published in 1643,

besides several pious works of less note. He died a prisoner, in great poverty, in 1645.

Baker, Sir Samuel White, an African traveller, born in London, June 8, 1821, was educated at a private school and in Germany, and at an early age went to Ceylon. There, along with his brother, he established in 1847 an agricultural settlement and sanatorium at Newera Ellia, 6200 feet above sea-level. He afterwards superintended the construction of the railway which connects the Danube across the Dobrudja with the Black Sea. In 1860 he married a young Hungarian lady of great talent and enterprise, and in company with her he undertook a journey of exploration at his own cost for the discovery of the Nile sources. They set out from Cairo in April 1861, reaching Khartoum in June 1862. When Baker quitted Khartoum to ascend the White Nile, he had an escort of 90 persons, 29 camels, horses, and asses, and three large boats. They had only been at Gondokoro a fortnight, when they were joined by Speke and Grant coming from the south, who told Baker of the Victoria Nyanza, which they had discovered; they also mentioned that the natives had described to them another great lake, named Luta Nzige. Baker resolved to reach this lake; and after many adventures, they arrived, on 14th March 1864, on the top of lofty cliffs, from which they beheld the vast inland sea to which Baker gave the name of the Albert Nyanza. He reached Gondokoro on March 23, 1865. In 1869-73 he commanded an expedition, organised by the pasha of Egypt, for the suppression of slavery and the annexation of the equatorial regions of the Nile Basin. After the British occupation of Cyprus in 1879, he made a thorough exploration of the island, and afterwards journeyed through Syria, India, Japan, and America. Baker was knighted in 1866; on his return from the Nile, he received medals from the Royal Geographical Society and the French Geographical Society; and he was decorated by the Khedive of Egypt. He is a Fellow of the Royal Society and other learned societies; and has received numerous foreign distinctions. Baker has published *The Nile and the Hound in Ceylon* (1854); *Eight Years' Wanderings in Ceylon* (1855); *The Albert Nyanza* (1866); *The Nile Tributaries of Abyssinia* (1867); *Ismailia, an account of his expedition of 1869-73* (1874); *Cyprus as I saw it in 1879* (1879); *Cast Up by the Sea*, &c.

Baker, Thomas, antiquary, was born at Lanchester, Durham, in 1656, and educated at St John's College, Cambridge. As a non juror, he lost in 1690 the rectory of Long-Newton, and in 1717 his fellowship, but he spent the last fifty years of his life at his old college, dying there in 1740. He published *Reflections on Learning*, and made valuable MS. collections on the history of the university, amounting to 42 folio volumes; whilst his *History of St John's College* was edited by Professor Mayor in 1867.

Bakewell, an ancient market town in Derbyshire, on the left bank of the Wye, 25 miles NNW of Derby. It has warm baths and a mineral spring, a fine but over-restored church, with an 8th or 9th century cross, and charming environs. Haddon Hall and Chatsworth being not far off. Pop. (1881) 2502.

Bakewell, Robert, grazier, was born in 1725 at Dishley, Leicestershire, and died in 1795. His fame rests on his successful efforts to improve the reputation

great as a breeder of sheep, that he received the almost fabulous sum of 1200 guineas for one season of a ram. The long-horned breed of cattle which he produced is still remembered as the Dishley or New Leicestershire breed. His horses were also

famous, and almost as profitable to him as his sheep. One of his objects was to produce a breed of animals that would fatten on the smallest quantity of food. Yet he was bankrupt in 1776.

Bakhmut, a town of Southern Russia, in the government of Ekaterinoslav, on a tributary of the Donetz. In the town are large works for melting tallow and wax, and near by are valuable coal-mines and alabaster quarries. Pop. (1881) 17,674.

Bakhtegan, or **NIRIS**, a salt-lake in the Persian province of Farsistan, 47 miles E. of Shiraz. Lying 5100 feet above the sea, it extends 74 miles south-eastward, and varies in width between 4½ and 13½ miles. It largely dries up in summer, when its bed yields very fine salt.

Baking is the mode of cooking food in an airtight chamber or oven. The term is also applied in the manufacture of Bricks (q.v.), Pottery (q.v.), &c. The baking of bread will be treated under BREAD. The oven that forms part of a kitchen-range is simply an iron chamber, with flues for conveying the heated gases of the fire round it. In baking, strictly so called, the oven is kept close, so that the steam and aroma arising from the inclosed substances are confined; but a great improvement is effected if a current of air is produced by ventilators. The rank taste that often characterises baked dishes is thus avoided; and the process may then be called *open-roasting*. Ovens are sometimes heated by water (superheated), and frequently now by gas. Meat for baking is placed in a dish, from the bottom of which, in some cases, it is raised on a wire frame or trivet.—Baking, although a convenient mode of cooking meat, is not considered quite so good as Roasting (q.v.). See also OVEN.

Baking Powder is essentially a mixture of tartaric acid and bicarbonate of soda. These are carefully dried and sifted together, some flour being usually mixed with them to dilute the strength. When added to flour in the manufacture of bread or scones, carbonic acid gas is liberated by the action of the water which is used, and this blows or puffs up the doughy mass, giving it the requisite lightness. Frequently the bicarbonate of soda is alone used, buttermilk or the natural acidity of the dough being depended on to evolve the gas. See BREAD.

Bakony Wald (Forest of Bakony), a densely wooded hill-country of Hungary, extending from Lake Balaton northward to the Danube, and dividing the great and little Hungarian plains. Immense herds of swine are annually driven hither to feed upon the mast of the forest. The swineherds furnished those notorious robbers who play so important a part in the ballads of the Hungarian people, and in the imagination of travellers. Its length is about 55 miles, its breadth 25 miles.

Bakshish. The ordinary meaning of this word in Persian is a present; but in the East, in modern times, it has acquired the special signification of gratuity (Fr. *pourboire*, Ger. *Trinkgeld*).

Baku, an important seaport of Russian Transcaucasia, on the Apsheron Peninsula, on a crescent-shaped bay in the Caspian Sea. The bay, which is about 7 miles from point to point, and 15 in circumference, is protected across the mouth by an island, which provides shelter and anchorage for shipping. Since 1883 it has been connected by rail with Tiflis, and so with Poti and Batoum on the Black Sea, 561 miles distant; and since 1887, by the North Caucasus Railway, with Novorossiisk on the Black Sea. The whole soil around Baku is impregnated with petroleum, which, monopolised till 1872, now forms the staple branch of its industry. Some of the fountains ignite spontaneously, and this natural phenomenon has

caused Baku to be esteemed as a holy city by the Parsees or fire-worshippers, many of whom resort to it from very long distances (see *ATESHGA*), although commerce has now invaded the sacred shrine. There is evidence that petroleum has been flowing from the Apscheron Peninsula for 2500 years. Of the 500 petroleum wells at Baku, most are situated on the Balakhani Peninsula, 8 or 9 miles to the north of the town. Lines of pipe carry the oil into the 'black town' of Baku, which is full of oil refineries emitting vast volumes of smoke, black and greasy buildings, and pools of oil refuse. One prolific well, tapped in September 1886, began to spout oil with extraordinary force, deluging the whole district. Nothing could be done to stop the outflow, which, on the eighth day, had reached a daily rate of 11,000 tons, or more than the entire produce of the world at the time. Another gigantic naphtha fountain burst out in March 1887, rising to a height of 350 feet, and after forming an extensive petroleum lake, forced its way into the sea. The production of crude petroleum in 1885 exceeded 420,000,000 gallons, and 120 firms have now oil refineries there. Great and destructive fires have occasionally occurred, as in 1887, when over 14,000 tons of stored naphtha was consumed in a conflagration that raged for five days. The system of carrying oil in bulk, introduced in 1879, has had a tendency to revolutionise the trade, and now there are more than a hundred such specially constructed steamers on the Caspian. The waste or residue is used as fuel in South-east Russia. A concession has been granted by the Russian government for laying down a petroleum pipe 600 miles long, to convey the oil from Baku to a port on the Black Sea. How rapidly the industry grew when communication was established with the outside world may be judged from the fact that the number of drilled wells increased from 1 in 1871 to 400 in 1883. Cotton, silk, opium, saffron, and salt are also exported. The Arabian Masudi is the first who mentions Baku, about 943, and he gives an account of a great volcanic mountain in its vicinity, which is now extinct. Baku was taken by Russia from the Persians in 1806. The marvellous development of the petroleum trade has revolutionised the place. There is a fine railway terminus near the town; and there is much bustling activity here. Persian booths have been replaced by spacious shops to supply the needs of a more advanced civilisation. The harbour, which is strongly fortified, is one of the chief stations of the Russian navy in the Caspian, and is also of great importance as a centre of trade. A good deal of shipbuilding is carried on. Pop. (1879) 15,604, chiefly Persians and Armenians. Baku is capital of a government of Russian Transcaucasia, with an area of 15,516 sq. m., and a pop. (1883) of 569,992. See Marvin's *Baku, the Petrobia of Europe* (1884); *The Region of the Eternal Fire* (1884); *The Coming Deluge of Russian Petroleum* (1886); also the article *PETROLEUM*.

Bakunin, MICHEL, a leading propagator of Anarchism (q.v.), was born near Moscow in 1814 of an aristocratic family, and entered the Russian army, but during service in Poland conceived such a hatred of despotism that he resigned his post. After 1846 he visited Germany, and also Paris, where he met Proudhon and George Sand. He took part in the German revolutionary movement of 1848-49, especially at Dresden, and was condemned to death. He was, however, given up to Russia, where he spent several years in prison, and was next sent to Siberia in 1855, but managed to escape in an American ship to Japan, leaving behind him wife and child, and arrived in England in 1861. In 1865 Bakunin was in Italy diffusing his socialistic views. In 1869 he founded the

Alliance of the Social-democracy, which dissolved the same year in order to enter the International; in September 1870 he attempted an abortive rising at Lyons, with an aim somewhat similar to that of the Paris commune in 1871. As the leader of anarchism, Bakunin was in the International the opponent of Karl Marx; but at the Hague Congress in 1872, he was outvoted and expelled from it. He died at Berne in 1876. Bakunin was most active as an agitator. In connection with his propaganda he wrote several works, in which atheism, materialism, and anarchism are advocated in the frankest and most uncompromising manner. The principal are *L'Empire Néo-germanique et la Révolution Sociale*; *La Théologie politique de Mazzini et l'Internationale*; *Dieu et l'Etat*.

Bala, a town of Merionethshire, North Wales, near the foot of Bala Lake, 12 miles SW. of Corwen by rail. Pop. 1653. Bala Lake measures 4 miles by 1 mile, and sends off the Dee from its foot. From Lake Fyrnwy, 10 miles to the south of Bala, Liverpool derives its new water-supply.

Bala Beds. The rocks of the Bala district, North Wales, contain two limestones, separated by some 1400 feet of arenaceous and slaty strata. The lower limestone (25 feet) is called the Bala limestone, and has been followed over a considerable area; the upper, or Hirnant limestone, is local. The lower, or Bala limestone, is supposed to be the same as the Coniston limestone of Westmoreland. Bala beds form a group of the Lower Silurian. In the Snowdon region they attain a great thickness, and show intercalated sheets of felsitic lava and tuff, bespeaking long-continued volcanic action. See *SILURIAN*.

Balaam, the name of a prophet not of Hebrew blood, mentioned in Numbers, xxii. xxiv. According to the story, Balak, king of the Moabites, alarmed at the intrusion of the Hebrews into his territories, forms a league with the Midianites, and sends messengers to Balaam with the rewards of divination in their hands. Refused permission from God, he consents to go only after a second summons from the king. On the way the angel of the Lord met him. The prophet's ass saw the apparition, and three different times turned aside out of the way in terror. Balaam, not seeing the angel, beat his ass three times, whereupon the beast opened his mouth, and 'spoke with man's voice, and stayed the madness of the prophet.' At last his eyes were opened to see the angel, and he was denounced for his sin. Three different times he tries to curse Israel for Balak, but as often the cursings turn to blessings in his mouth, and he breaks out into the loftiest strains of prophetic poetry in praise of the glorious destiny of Israel. But though he could not belie the prophetic function by cursing the Israelites, he succeeded in causing them for a time to forfeit the favour of Jehovah, by leading them into sin through a special temptation which Balak and the Moabites on his advice spread before them. The prophet perished in the vengeance taken by the command of Jehovah upon the sinners. Such is the strange story of the true prophet 'who loved the hire of wrong-doing,' and who is taken in the Scriptures as the constant type of those men who prostitute their powers and hold the truth in unrighteousness, receiving the wages thereof.

Balachong, a condiment much used in China for eating with rice. It is made of putrid shrimps or small fish pounded with salt and spices and then dried.

Bala'na. See *WHALE*.

Balæniceps ('whale-headed'), or Shoe-billed Stork, is a gigantic gallatorial bird found only on the Upper Nile. It has a large hooked very broad

and flat bill, resembling that of the Boat-bill (q.v.), and lives mainly on lizards and other reptiles. The *Baleniceps* *recrei* belongs to the *Umbres* subdivision of the stork family.

Balenoptera. See RORQUAL.

Balaghat' ('above the Ghats'), the name given to a large tract of elevated country in the south of India, extending from the rivers Tumbuddra and Krishna in the north to the farthest extremity of Mysore in the south. Also the name of a British district in the Central Provinces. Pop (1881) 340,554.

Balahissar, a village on the site of the ancient *Pessinus*, in the south-western part of the province of Angora, in Asia Minor. The ancient town was famous for its worship of Cybele, and among the fragments of marble columns, friezes, &c., rise the ruins of her gorgeous temple and remains of a theatre in partial preservation, a castle, and a circus.

Balaklava, a small Greek fishing-village with 700 inhabitants, in the Crimea, 8 miles SE. of Sebastopol, from which it is separated by a rocky peninsula. The harbour, which affords secure anchorage for the largest ships, till 1860 was a naval station. It is perfectly landlocked, the entrance being so narrow as scarcely to admit more than one vessel at a time. To the east, overlooking the bay from a rocky eminence, are the ruins of a Genoese fortress. Balaklava is the *Symbolon Limen* of Strabo, and the *Cembalo* of the Genoese (1365-1475), who were expelled by the Turks, as these were in turn by the Russians, when Catharine II. made it the seat of a Greek colony. From September 1854 to June 1856 it was the British headquarters during the Crimean War (q.v.), and the famous charge of the Six Hundred (25th October 1854) has made the name glorious as Thermopylae.

Balance (from Latin *bilanx*), an instrument for ascertaining the mass of bodies in grains, ounces, pounds, or any other units of mass. The ordinary balance consists of a lever called a beam, supported in the middle of its length, and having dishes or scales suspended from either extremity. As it is of importance that the beam should move easily round its support, it rests on polished agate or steel planes, by means of knife-edges of tempered steel, which project transversely from its sides, and serve as the axis of rotation. By this arrangement the surface of contact is practically reduced to a line, and the friction of the axis of the beam on its support almost entirely obviated. The scales are hung by means of chains or cords attached to hooks, which rest on knife-edges turned upwards instead of downwards as in the first case. The essential requirements of a balance of this description are: 1st, That the beam shall remain in a horizontal position when no matter is in either scale; 2d, That the beam shall be a lever of equal arms, or have the distances between the central knife-edge and those at either end exactly the same; and 3d, That the balance shall possess *sensibility*—i.e. shall turn readily from its horizontal position when there is a slight excess of matter in one of the scales. To insure the first of these conditions, it is necessary that the centre of gravity of the beam lie vertically below the point of support when the beam is horizontal. When such is the case, the centre of gravity at which the weight of the beam may be considered to act oscillates as in a pendulum round the point of support, and always comes to rest right under that point, thus restoring to the beam its horizontal position when it has been tilted out of it. If the centre of gravity were above the point of support, the beam would topple over; and if it coincided with that point, there being no restoring force, the beam would occupy indifferently any

position into which it was thrown, the balance in both cases being useless. That a balance possesses the second of the above conditions, is ascertained by putting into the scales masses which keep the beam horizontal, and then transposing them, when, if it still remain so, the lengths of the arms are equal. Should the arms be of different lengths, a less mass at the end of the longer arm will balance a larger mass at the end of the shorter arm (see LEVER); but when transposed, the larger mass having the longer arm, and the smaller mass the shorter, the beam can no longer remain horizontal, but will incline towards the larger mass. A balance with unequal arms is called a false balance, as distinguished from an equal-armed or just balance. When employing a false balance, it is usual to place a body in both scales, and take the arithmetical mean—that is, half the sum—of the apparent masses for the true mass. This is near enough to the truth when the apparent masses differ little from each other; but when it is otherwise, the Geometrical Mean (q.v.) must be taken, which gives the exact mass in all cases.

The third requisite—the sensitiveness—depends upon the weight of the beam, the position of its centre of gravity, and the length of its arms. Let ABD (fig. 1) represent the beam of a balance, C the point of suspension, G the centre of gravity, and ACB the straight line joining the knife-edges, which may be taken as the skeleton lever of the balance. We shall here confine our attention to that construction where the three knife-edges are in a line, because it is the most simple, and at the same time the most desirable. We may, without altering the principles of equilibrium, consider the

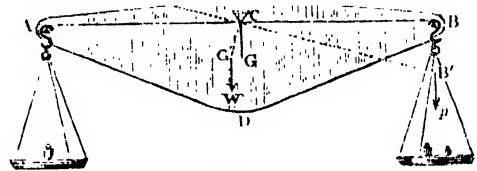


Fig. 1.

beam reduced to the lever AB, and embody its weight in a heavy point or small ball at the centre of gravity, G, connected with C by the rigid arm CG. The weights of the scales and contained equal masses act at A and B, and have no influence on the position of the beam since the arms are equal. If a small additional weight, *p*, therefore, act at B, the position of the beam is determined by its rotating tendency (moment) round C, and the counter-rotating tendency of the weight of the beam, *W*, acting at G. The question of sensitiveness is thus reduced to the action of the crooked lever GCB, with *p* acting at one end, and *W* at the other. The relations of the arms and forces of a crooked lever will be found under LEVER. It is only necessary here to state, that the moment of the weight acting at the end of a crooked lever, increases with its size, the length of its arm, and the smallness of the angle which that arm makes with the horizontal line passing through the fulcrum. Consequently, the longer the arms of a balance are, all other things being the same, the greater will be its sensitiveness. Also, the nearer the centre of gravity of the beam is to the point of support, the greater will be the sensitiveness of the balance; and, lastly, the smaller the weight of the beam, the greater will be the sensitiveness of the balance.

In the construction of the balance, it is a matter of importance to have the sensitiveness independent of

the weight of the scales and contained masses, so that, when heavily loaded, a small weight will produce the same inclination as when not loaded at all. This condition is implemented, as we have already shown, when the three knife-edges are kept in the same straight line. If the line joining the two terminal knife-edges lie below the point of suspension, then the centre of gravity of the equal masses will, upon the turning of the beam, be forced from below that point, and will accordingly have a tendency to resume its former position. The equal weights thus counteract to some extent the effect of the additional weight, and their influence in this way will be all the greater as they themselves increase.

When a balance is very sensitive, the beam keeps oscillating for a considerable time from one side to the other of the position in which it finally settles. The stability, or the tendency of the beam to come quickly to rest, depends on requirements nearly the opposite of those which conduce to sensitiveness. In the construction treated of above, the stability increases with the moment of the weight of the beam acting at G round C , so that it thus increases with the weight of the beam, and the distance of the centre of gravity from the point of suspension. The stability is also increased, as already shown, by having the line joining the scale knife-edges below the point of support.

Fig. 2 is the representation of one form of the delicate balances employed in physical and chemical

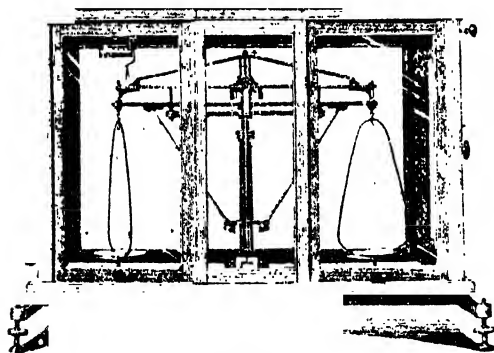


Fig. 2.

researches. The beam is constructed of aluminium, so as to combine lightness with strength, and rests by a fine agate knife-edge on an agate plane. The pans are also hung on agate knife-edges and planes. In the upper part of the beam is a small body moving on a screw, so that the sensitiveness may be increased or diminished according as the body is raised or depressed. In order that the knife-edges may not become blunted by constant contact with the supporting planes, a cross-bar, with projecting pins, is made to lift the beam from the plane, and the pans from the beam, and sustain their weights when the balance is not in play. The beam is divided by lines marked upon it into ten equal parts, and a small piece of fine wire bent into the form of a fork, called a rider, is made to slide along to any of the divisions. If the rider be, for instance, $\frac{1}{5}$ of a grain, and if, after the mass of a body is very nearly ascertained, it brings the beam, when placed at the first division next the centre, exactly to its horizontal position, an additional mass of $\frac{1}{10}$ of a grain will be indicated. As the beam takes some time before it comes to rest, it would be tedious to wait in each case till it did so, and for this reason a long pointed index is fixed to the beam below the point

of suspension, the lower extremity of which moves backward and forward on a graduated ivory scale, so that when the index moves to equal distances on either side of the zero point, we are quite certain, without waiting till it finally settles, that the beam will be horizontal. When great accuracy is required, a microscope is used to read the oscillations. The balance is surrounded by an air-tight case to keep out dust, &c.; sliding doors giving access to the pans. A small dish of strong sulphuric acid, or dry carbonate of potash, is kept inside to keep the atmosphere of the case dry. Even with the best achievements of mechanical skill, no balance can be made whose arms are absolutely equal; and to remedy this defect, the method of 'double-weighing' is resorted to, when the utmost accuracy is demanded. This consists in placing the body into one scale, and sand, or the like, into the other, until exact equilibrium is obtained, then removing the body, and putting in its place known masses (weights) which produce equilibrium again. The mass of the body must evidently be equal to the sum of the known masses.

The Roman balance, or *Steelyard* (Ger. *Schnellwaage*), is more portable than the ordinary balance.

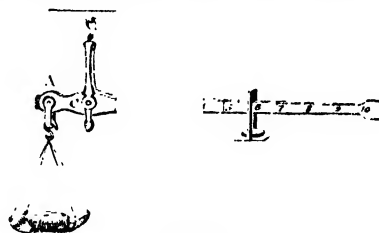


Fig. 3.

Its construction is indicated in fig. 3. AB is the beam, and C is the fulcrum. Taking the particular case indicated in the diagram, it is evident from the principles of the lever that the mass W is six times the mass P . As the steelyard is ordinarily made, the long arm is heavier than the short one, and therefore the graduation commences from a point between A and C , and not at C .

The *Beam Leger Balance* (Fr. *peseon*, Ger. *Zeigerwaage*), shown in fig. 4,

is a lever of unequal arms, A, C, B , moving round the pivot C , having a scale, Q , attached to the shorter arm AC , and a fixed mass, W , to the longer arm CB . The longer arm ends in a pointer moving in front of a fixed graduated arc. When a body is put into the scale, the pointer rises from the bottom or zero point of the arc, and rests opposite the mark corresponding to its weight. The higher the mass W rises, the greater becomes the moment of its weight, and the greater must be the mass whose weight it balances. The arc is generally graduated experimentally.

For other weighing apparatus, see **WEIGHING-MACHINES**; and for the law of unjust weighing, see **WEIGHTS AND MEASURES**.

Spring-balance.—The commonest form of the spring-balance, known as *Natter's Balance*, is shown in fig. 5. It consists of a spring in the form of a cylindrical coil in a metal case, which it about half fills when at rest. The upper end of the spring is fixed through the top of the case to a ring by which

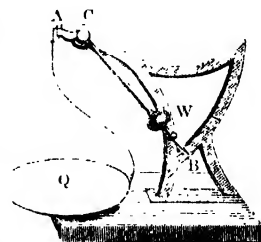


Fig. 4.

it is suspended for use. To the lower end of the spring a rod is attached having an index-pointer working through a slot in the front plate of the



E °]



Fig. 5.

case. The substance to be weighed is fixed on a hook at the bottom end of the rod, and the weight as indicated by the stretching of the spring is read off on the scale (a part of the front plate has been removed in the figure, to show the spring inside). Another common form, called the Household Balance, is made to stand on a table, and has a dial-plate on which an index-finger registers the weight. The article to be weighed is put into a pan on the top of the balance. From the under side of the pan a rod goes down into the case; a cross bar at the bottom of this rod is attached to the lower ends of two coiled springs, the upper ends of which are fixed. A rack on the side of the rod, acting on a toothed wheel in conjunction with a system of levers, transfers the action of the rod under the weight in the pan to the index-finger, which registers the amount on the dial-plate. Spring-balances are also made in a great many other forms, and for various purposes, such as

letter balances, parcel balances, &c.; but the principle in all is the same—viz. the stretching of a spiral spring. They have no pretension to great accuracy, but are in extensive use for ordinary purposes, and have the advantages of being portable and having no weights to get lost. The spring-balance is also used as a Dynamometer (q.v.).

Balance of Power. an expression used for that state of things in which no one of the European states is permitted to have such a preponderance as to endanger the independence of the others. This idea is not confined to modern times. The Greeks acted upon it more or less distinctly with regard to the relations of such states as Sparta, Athens, and Thebes. It was, however, more distinctly avowed as a motive of political conduct, and more systematically acted upon, after the time of Charles V. For nearly a century and a half the house of Hapsburg, of which Charles was the first great chief, seemed to strive at universal empire. The Thirty Years' War was waged not only to save Protestantism, and to prevent Austria from becoming master in Germany, but to hinder the predominance in Europe of a single crown. The motive of preserving the balance of power came most distinctly into the foreground in those unions which England, Holland, and Austria repeatedly formed against the menacing schemes of Louis XIV. for acquiring supreme power in Europe. It was the same cause that broke up the most dangerous (for Louis) of these coalitions; for in the war of the Spanish Succession, when the Hapsburg pretender to the Spanish throne became, by the death of Joseph I., sovereign of Austria and emperor of Germany, and the power which, in the hands of Charles V., had menaced the equilibrium of Europe, was thus likely to be again wielded by one man. England withdrew from the coalition, and thus saved Louis from a decided overthrow. The aggressive policy of Napoleon called all the nations of Europe to arms against him in the name of the balance of power; and in readjusting the map of Europe, the balance of power was often invoked to cover the jealousy which resisted not a few claims

to restitution of territory. For some time the balance of power in Europe was embodied in a pentarchy or virtual leadership of the five great powers, who mutually watched one another's movements. The formation of the kingdom of Italy has increased the number of great powers to six. The rise of Germany since the war of 1870-71 has given it a leading place in maintaining the European balance. The great development of Russia, and the continuity of her aggressive policy in the East, form a most important element in the European equilibrium. Since the doctrine of non-intervention has to a large extent gained ground, the idea of a balance of power has been less esteemed in Great Britain. There can be no doubt that the idea has prevailed chiefly since the rise of the great centralising states under absolute dynasties at the close of the feudal period, and that the true welfare of peoples has been again and again sacrificed to the balance of power and to dynastic interests therewith connected. Yet so far as the maintenance of the balance of power has tended to protect the independence of European states against great aggressors, and to prevent the predominance of a single despotic empire, it has been beneficial. Further, it may be pointed out that so long as Britain is an imperial state, she cannot altogether abstain from intervention in European politics, and from considering how the balance of power there affects her interests. On the whole, though the idea of a balance of power in its old form has fallen into disrepute, it may still be considered a working factor in politics. And the subject is greatly widened and complicated by the extension of European influence and European possessions all over the world. Interesting points in this connection are the rivalry of Russia and Britain in the East, the difficulties chiefly with France as to the regulation of Egypt and the Suez Canal, the rise of the colonial power of Germany, and the entry of China and Japan into the circle of European policy. See *Dike's European Politics* (1887).

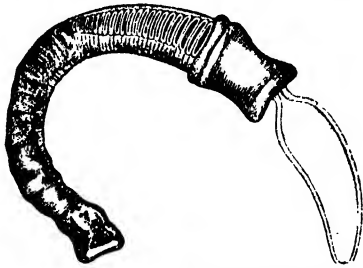
Balance of Trade. The theories connected with the balance of trade arose out of the 'mercantile system' of political economy. In the mercantile system, which looked upon the possession of gold as the grand aim, it not unreasonably came to be a maxim that a nation becomes richer in proportion as the money-value of its exports exceeds that of its imports; the excess being paid in gold, was thought to be just so much added to the national wealth. Now, the difference between the money-value of the exports and imports of a state is called the 'balance of its trade;' and by the adherents of the mercantile system, this balance was said to be 'in favour' of the country or 'against' it, according as the exports or the imports showed the excess.

As a practical result of this theory, every sort of device was adopted in order to bring out a favourable balance. Laws were enacted prohibiting importation of foreign manufactures, or imposing high duties upon them, and giving premiums and other protective encouragements to exportation. The aim of commercial legislation, in short, was to promote the flow of the precious metals to one's own country, and to keep them there. The fallacies of the balance of trade were obviously due to a mistaken conception of the nature of wealth, and must therefore be traced to the errors of the Mercantile System (q.v.).

Connected with this, though very different, are the recent discussions regarding the balance of trade. For many years the imports of Great Britain have in value greatly exceeded the exports. Will not this tend eventually to the national impoverishment, especially as so large a proportion of

the imports is devoted to consumption as food and luxuries? With reference to this question, the following points should be considered: That a great proportion of the revenue of this country is drawn from investments abroad, and with these investments we can pay largely for our imports; also that an important part of our business with foreign countries consists in a carrying trade, from which we draw considerable profits. In point of fact, our national wealth is continually growing, though doubtless Britain has reached a stage when an increasingly large proportion of its wealth must be devoted to investment abroad, and a less proportion to productive work at home. In this question there is a special necessity for a criticism of statistics, figures being so misleading unless they are carefully scrutinised.

Balanoglossus, a worm-like animal of much zoological interest as a connecting link between invertebrates and vertebrates. The genus, which includes at least four species, occupies so unique a position that it is regarded as representative of a distinct class of Enteropneusta ('gut-breathers'). The animals live in fine sand, which they appear to saturate with slime. They eat their way through it, drawing themselves on by means of the contractions of the most anterior part of their body.



Young *Balanoglossus*; showing proboscis, collar, gill-slits, and gastric region (from Claus).

The body is richly ciliated and extremely soft; and it is thus very difficult to obtain large specimens intact. *Balanoglossus sarniensis*, which occurs as a rarity in the English Channel, has been aptly compared, as regards its softness, to wet bread. This form may attain a length of 8 inches or more. Two species have been found in the Gulf of Naples, and two in more northerly waters. The body exhibits four distinct regions, a large 'proboscis' in front of the mouth, a muscled collar of some length, a respiratory region, through slits in which water flows out from the gullet, and lastly, a long gastric region with most of the digestive and reproductive systems.

Apart from numerous peculiarities in the structure and development of *balanoglossus*, the general fact of importance is its remarkable combination of characters uniting it to widely separated types. It is what is known as a synthetic type—that is to say, it unites features characteristic of very different groups. In the language of zoological pedigree, it is a survivor of an ancestral group from which several others started. Thus the larva, which is known as *Foraria*, is in some respects 'intermediate between the larva of an echinoderm and the larval type common to molluscs, chaetopod worms,' &c. Indeed, Johannes Müller, who first described the *Foraria*, regarded it as the larva of an echinoderm. This very close structural resemblance between the *Foraria* and the typical echinoderm larva is usually interpreted as suggesting a common origin for the two groups. Quite as striking are the affinities between *balanoglossus* and a primitive vertebrate. As in the latter the anterior

portion of the alimentary canal, which is supported by a horny basket-work, is pierced by paired respiratory gill-slits, to all appearance comparable to those which persist in low vertebrates, and appear in the embryonic life of all. There are also structures which are believed by some to be more or less directly comparable to the dorsal nerve-cord and the supporting axis or notochord, so characteristic of vertebrates. Undoubted affinities must be admitted, and this fact likewise is interpreted in terms of the history, by regarding *balanoglossus* as a survivor of a primitive ancestral group, from which not only echinoderms, but vertebrates diverged. See CLASSIFICATION, VERTEBRATA, WORMS; and for full information, Bateson's papers in *Quarterly Journal of Microscopical Science* (1884).

Balanus. See ACORN-SHELLS.

Balasinar, a tributary state of India, in the province of Guzerat, Bombay. Area about 150 sq. m.; pop. 42,000. The chief town, Balasinar, is 51 miles N. of Baroda. Pop. 9000.

Balasar, a seaport and chief town of a district of Bengal, on the right bank of the Barabalong River, 15 miles from its mouth. It has dry-docks and a coasting-trade. Pop. (1881) 20,265.

Balaton, LAKE (Ger. *Platten-See*), a lake, the largest in Hungary, about 55 miles SW. of Pesth. Lying 426 feet above sea-level, it has an extreme length of 48 miles, an average breadth of 10 miles, and an area of 245 sq. m. Its mean depth is 20 feet, but in one part it sinks to 150. It is fed by upwards of thirty streams: the chief of which is the Szala as well as by numerous springs which rise on its margin. Its outlet is by the Sio, which discharges itself into the Sarvitz, a feeder of the Danube. The waters of Balaton are clear and transparent, except when they are agitated by a storm, when they assume a bluish colour. They have a slightly brackish taste. Fish of various kinds are found in abundance, including the *fugash*, a kind of large perch, weighing from 10 to 20 pounds, and found only in this lake. The lake figures prominently in the old romantic ballads of the Magyars.

Balausta. See BERRY.

Balbi, ADRIANO, geographer and statistician, was born in Venice in 1782, and in 1808 was appointed lecturer on Geography at Murano, in 1811 on Physics at Fermo. A subsequent residence in Portugal led him to publish at Paris in 1822 a work of great value on the statistics of Portugal. Balbi lived in Paris till 1832; he then returned to Italy and settled at Padua, where he died 14th March 1848. His *Atlas Ethnographique du Globe* (Par. 1826) is distinguished by its extensive accumulation of facts and views, giving an account of German researches on the subject, and entering into questions of comparative philology. His best known work is the *Abriégé de Géographie* (1832). His *Scritti Geografici* were edited by his son, Eugenio (5 vols. Turin, 1841-42).

Balbi, GASPARO, a Venetian merchant of the 16th century, who is worthy of mention as the first traveller who has left an account of India beyond the Ganges. In the pursuit of his calling, Balbi was often led to Aleppo, and from thence, on one occasion, he made a visit to India which lasted several years. A Latin translation of his *Viaggio* (1590), or account of his travels, was printed at Frankfurt in 1594. In his journey he visited Bagdad, Bassora, Goa, Cochin, and Pegu. He minutely records his own observations, but is excessively credulous in accepting information at second-hand.

Balbo, CESARE, COUNT, an Italian statesman and author, was born 21st November 1789 at Turin.

His father enjoyed the patronage of Napoleon; consequently the son served in various capacities under the empire, and afterwards as secretary of the Sardinian embassy at London. During the years 1821-43, he produced several works of a politico-historical nature. His *Speranze d'Italia* ('Hopes of Italy'), published in 1843, gave a vivid and intelligent picture of the political condition of Italy. It did not aim, however, at Italian unity, but rather suggested a confederacy of independent states, under the supremacy of the pope. Balbo's adherence to the Roman Catholic Church is strongly marked in all his works. He took a prominent part as a moderate Liberal in the political movements of 1847-48. He died 3d June 1853. See *Lives* by Ricotti (1856) and Reuchlin (1860).

Balboa, VASCO NUÑEZ DE, a Spanish conqueror, was born of a noble but reduced family at Xeres-de-los-Caballeros in 1475. After rather a dissolute youth, he gladly took part in the great mercantile expedition westward led by Rodrigo de Bastidas. He established himself in St Domingo, and began to cultivate the soil; but fortune proving adverse, in order to escape from his creditors, he had himself smuggled on board a ship, and joined the expedition to Darien in 1510, commanded by Francisco de Enciso. An insurrection which took place obtained for Balboa the supreme command in the new colony. Confused accounts which reached him of a great western ocean, impelled him in 1513 to set out in quest of it. On the 25th of September of that year, he obtained the first sight of the Pacific Ocean from 'a peak in Darien.' The governorship of the territories conquered by Balboa was obtained in 1514 by Pedrarias Davila, by means of his intrigues at the Spanish court. Balboa resigned the command into the hands of the new governor, a narrow-minded and cruel man, and, in a subordinate situation, undertook many successful expeditions; but these and all his other merits only served to increase Davila's hatred towards him. Balboa married his enemy's daughter; but on the first occasion of dispute, he was induced by Davila to deliver himself up, was accused of a design to rebel, and in violation of all forms of justice, was beheaded at Santa Maria in 1517.

Balbriggan, a watering-place in Dublin county, 21 miles N. by E. of Dublin. It is a seat of linen, cotton, calico, and stocking manufactures. The cotton stockings made here are remarkable for fineness of texture and beauty of open work. Many women are employed in embroidering muslin. Pop. (1881) 2443.

Balcony (till about 1825 BALCONY; Ital. *balcone*), a projecting gallery in front of a window or of several windows, with a balustrade or parapet at its outer edge, and supported by consoles, or brackets fixed in the wall, or by pillars resting on the ground below. The balcony was unknown in Greek and Roman architecture, the earliest examples of it occurring in Italy, to the climate of which country it is peculiarly adapted.

Baldachin (Ital. *baldo chino*), a canopy of the form of a tent or umbrella, made of costly materials and richly adorned, which is either supported on pillars, or fastened to the roof over a throne or couch, or over a pulpit, altar, or other sacred object. One of the most celebrated is the baldachin in the church of St Peter's in Rome, cast in bronze by Bernini, which is supported on four large twisted columns. From the days of Constantine, altars were often overshadowed by canopies called *ciboria*, from their resemblance to the bowl of a cup; and the sacrament was placed in a vessel suspended by a cord from the interior of this cupola. The proposal to erect a baldachin in

St Barnabas Church, Pinlicko, gave rise to litigation, which ended in a decision (15th December 1873) against the legality of such a structure in an Anglican church. Baldachin is also the name given to a kind of umbrella of a square form, supported on four poles, borne over the priest who carries the Host. The name, as well as the thing itself, comes from the East, where a baldachin was borne as a symbol of their rank over the heads of the great. Such canopies were often sent as presents from eastern princes to those in the West; as, for example, from the Calif Haroun-al-Raschid to Charlemagne. During the Crusades, and the consequent trade with the East, they became well known to the Italians, and baldachin is merely a corruption of Baalalak, the name by which Bagdad was then known to Europe.

Balder, or BALDUR, the hero of one of the most beautiful and interesting myths in the Edda, was, according to northern mythology, son of Odin and Frigga, and the husband of Nanna. Having dreamed evil dreams which threatened his life, he related them to the gods, whereupon they held a council, and endeavoured to secure his safety. Frigga took an oath from everything in nature, animate and inanimate alike, that it would not harm Balder, but she forgot the mistletoe. The gods, thinking Balder safe, in their mirth wrestled with him, and cast darts and stones at him. The malicious Loki alone took no part in the play, but changing himself into the form of an old woman, found out from Frigga that the reason for Balder's invulnerability was that everything but the little mistletoe had sworn not to harm him. Loki went in haste to fetch a bough, and repaired with it to the assembly of the gods, where he placed it in the hands of the blind Hoder, the god of war, and directed his aim against Balder, who fell pierced to the heart. The sorrow of the gods was unutterable. Hermoder (the nimble) at once started on his journey to ask Hel, the goddess of Hades or the grave, to release Balder. She at once consented, on condition that all things should weep for Balder. All things wept, save the witch or giantess Thökk (the step-daughter of Loki), and so Balder must remain in the kingdom of Hel until the end of the world. At his funeral the pyre was placed on board his ship in presence of the frost-giants.

Balder is the best and wisest of the Æsir. His death is the great turning-point of the drama, as it proves the mortal nature of the gods. The powers of evil could not prevail as long as he lived, but his death is the doom of all the Æsir. Loki and his brood of wicked monsters are at first subdued, but at last they burst their bonds, and the great catastrophe of Ragnarök ensues. After long winter and war between the gods and the collected frost-giants, the forces of cold, fire, and darkness, in which both adversaries perish, comes the complete renovation of the world, in which the chief of the Æsir are hallowed and purified, and Balder returns from the under-world to inaugurate a reign of happiness and peace. It is probable that in the story of Balder there is an admixture of physical and moral allegory. Originally a nature-myth, it underwent a transformation through the addition of ethical conceptions, but the same early form continued to express the later religious ideas. See SCANDINAVIAN MYTHOLOGY; Grimm's *Deutsche Mythologie*; and Schwartz, *Indogermanischer Völkerglaube* (Berl. 1885).

Baldmoney is a popular name for several kinds of Gentian (q.v.), also for an umbelliferous plant (*Meum athamanticum*) used as a carminative medicine.

Baldness (Gr. *alopecia*, 'fox-mange'). See HAIR. *Congenital baldness* (complete absence of hair at birth) is sometimes met with; but in most cases is only temporary, and gives place in a few years to a natural growth of hair. Occasionally, however, it persists through life.

Senile baldness (calvities) is one of the most familiar signs of old age. It commences in a small area at the crown, where the natural hair is first replaced by down before the skin becomes smooth and shining. From this area the process extends in all directions. It is more common in men than women. A precisely similar condition occurs not unfrequently at an earlier age (presenile baldness). It is generally due to hereditary tendency; but is favoured by keeping the head closely covered, especial with a waterproof cap. The best authorities agree that this form of baldness is incurable.

There is a condition, however, which in its later stages much resembles the last, but is more amenable to treatment. Here the loss of hair begins simultaneously at two spots, at the crown, and about an inch behind the margin of the hair on the forehead. Its chief characteristic, however, is that loss of hair is preceded for some years by extreme scurfiness of the scalp. During this stage the process can be checked; sometimes, indeed, even after loss of hair has begun. The most successful treatment consists in thorough rubbing of the scalp with an ointment containing 1 part of precipitated sulphur to 10 parts of lard, at first nightly, then as the scurf diminishes, at gradually longer intervals.

Great loss of hair frequently follows severe illnesses or other causes which produce general debility. As health returns, the hair usually returns with it; its growth may be promoted by the use of lotions containing caustic potash, ammonia, or some other stimulating agent. Baths containing common salt, and brisk rubbing, are also useful.

Baldness in patches (*alopecia areata*) attacks chiefly children and young persons, frequently those of debilitated constitutions. The only change at first perceptible is that the hair falls out in one or more places, leaving smooth bare patches. These may gradually extend, and with the progress of the disease the affected skin becomes somewhat thinned. The scalp is the part most commonly attacked; but the disease may destroy every hair on the body. It is liable to be mistaken for Ringworm (q.v.); but in that disease the skin is rough and scaly, and the hairs, though broken off short, are not completely lost. *Alopecia areata* has been attributed to the action of a parasite; but it is more probably due to some obscure nervous influence. Mild cases almost always recover; and even in the worst forms of the disease complete restoration of the hair may take place, sometimes after many years of baldness. The treatment consists in stimulation of the affected skin, blistering, salt baths, the use of electricity, &c.

In this as in all other forms of loss of hair, attention must be paid to the general as well as the local treatment. A liberal diet and the use of iron and other tonics are frequently of the greatest service.

The numerous and much advertised hair restorers, &c. in the market contain various stimulating substances, and are, generally speaking, beneficial in their action.

Baldric is a belt or sash worn partly as a military and partly as a heraldic symbol. It goes round the waist as a girdle, or passes over the left shoulder, and is brought down obliquely under the right arm, or is suspended from the right shoulder in such a way as to sustain a sword. Many of the

effigies of knights contain representations of the baldric, more frequently as a belt than a shoulder-sash.

Baldung, HANS, called also Hans Grün, a German painter and engraver, contemporary with Albert Dürer, to whom, in expression, colouring, and finish, he was little inferior. He was born at Gmünd, in Swabia, about 1476, and died at Strasburg in 1545. His masterpiece, a painting of the Crucifixion, is in the cathedral of Freiburg; his wood-engravings are numerous.

Baldwin I., king of Jerusalem, 1100-18, was born in 1058. He was the youngest brother of Godfrey (q.v.) de Bonillon, with whom he took part in the first Crusade; but having quarrelled with Tancred, he retired to Edessa, of which he was soon after elected prince. After the death of his brother Godfrey, in 1100, he became Protector of the Holy Sepulchre, and Baron of Jerusalem, and immediately assumed the regal title, which his brother had refused. He conquered Casarea, Ashdod, and Tripolis, and, with the assistance of a Genoese fleet, made himself master also of Acre, and subsequently of Sidon, but failed to reduce Ascalon. He died in 1118.—BALDWIN II., cousin and successor of Baldwin I., reigned from 1118-31. During his reign Tyre was taken, and the order of the Templars was instituted. He died in 1131, having resigned the crown in favour of his son-in-law, Foulques of Anjou, who reigned till 1134.

BALDWIN III., king of Jerusalem, 1143-62, the son and successor of Foulques of Anjou, was born in 1129. He was regarded as a model of knight-hood, and his authority and influence were great. He died in 1162, and with his death the Christian power in the East began to decline. He was succeeded in the government by his brother Amalric, who died in 1173. BALDWIN IV., the son and successor of Amalric, surnamed the Leper, reigned till 1184, when he caused BALDWIN V., a child of six years old, the son of his sister Sybilla, to be crowned. The child died in 1186.

Baldwin I., the first Latin emperor of Constantinople, was born at Valenciennes in 1171 A.D., and succeeded his parents as Count of Hainault and Flanders in 1195. In 1200 he joined the fourth Crusade, and assisted in the recapture of Constantinople for the Emperor Isaac II. As the latter failed in his payments, the Crusaders turned their arms against him, and sacked the town. Alexis having been murdered in a rising of the citizens, Baldwin was chosen emperor, and crowned in 1204. The Greeks, invoking the aid of the Bulgarians, rose and took Adrianople. Baldwin laid siege to the town; but, defeated and taken prisoner by the Bulgarian king, he died about a year after (1206) in captivity.

Baldwin II., emperor of Constantinople, was born in 1217. He was the son of Peter de Courtenay and Yolanda, Countess of Flanders, sister of Baldwin I. He was but 11 years old when, by the death of his brother Robert, he succeeded to the throne; and he never had the means or the ability to maintain his position against his powerful Greek and Bulgarian opponents. Two begging-visits to Western Europe were not successful in procuring him sufficient forces to resist his foes; in 1261 his capital was taken by one of the generals of Michael Paleologus; and Baldwin fled to Italy. With him terminated the Latin empire in the East, after it had lasted 57 years. He died in 1273.

Bale. See BASEL.

Bale, JOHN, Bishop of Ossory, was born at Cove, near Dunwich, Suffolk, in 1495. From a Carmelite monastery at Norwich he passed to Jesus College, Cambridge, and obtained a living in

his native county, though he had already turned Protestant. In 1540 he had to flee to Germany, whence, in 1547, he was recalled by Edward VI., who two years later made him Bishop of Ossory in Leinster. Here 'Bilious Bale' made himself so obnoxious to the Catholics by his zeal in the Protestant cause, that, on news of the death of Edward, his house was attacked and five of his servants killed. His effects were destroyed, and he himself escaped out of the country only with great difficulty. On the accession of Elizabeth he returned to England, and was made a prebendary of Canterbury. He died in 1563. His fame rests partly on a Latin history of English literature (1548), which, notwithstanding that sections of a book are not unfrequently set down in it as distinct works, and that persons who never wrote anything are given as authors, is a valuable work. He occupies, also, an important place in the history of the drama. His plays are sorry doggerel; yet his *Kinge Johan* (Camden Society, 1838) is a link between such moralities as his own *Briefe Comedy of Johan Baptyste* and the masterpieces of the Elizabethan stage. The Parker Society published his select works (1849).

Balearic Isles, a group of islands—Mallorca (Majorca), Minorca, Ibiza, Formentera, Cabrera, and several smaller islets—lying off the coast of Valencia. They formed from 1220 to 1344 the kingdom of Mallorca, which was united in 1349 with the crown of Aragon. They now form a Spanish province, and together have an area of 1935 sq. m., with a pop. in 1884 of 306,847. The soil generally is good. Vines, olives, and other fruit-trees are cultivated abundantly; but corn has to be imported. The coasts are precipitous, with some excellent harbours—Port Mahon, in Minorca, being one of the finest in Europe. The Phœnicians visited the Balearic Isles at a very early date, and they were followed by the Greeks. Later, the Balearic Isles became subject to Carthage; but after a short period of freedom, during which their inhabitants became pirates, were annexed to the Roman empire by Metellus (*Balearius*), 123 B.C. The *Baleares* were famous slingers; their name was derived by the ancients from the Greek *ballein*, 'to throw.' See the articles on the several islands, also SPAIN; and Bidwell's *Balearic Isles* (1876).

Baleen, a name for whalebone. See WHALE.

Bale-fire. See BEACON.

Balfe, MICHAEL WILLIAM, composer, was born in Dublin, 15th May 1808. His musical talent received early culture, and in his ninth year he made his debut as a violinist, having begun to compose at least two years earlier. In 1823 he came to London, and during 1825-26 studied in Italy under Paer, Galli, Federici, and Rossini. In 1826 he wrote the music for a ballet, *La Pérouse*, performed at Milan; and in 1827 he sang in the Italian Opera at Paris with great applause, his voice being a pure rich baritone. In 1833 he returned to England and in 1846 was appointed conductor of the London Italian Opera. He died at Royston Abbey, his estate in Hertfordshire, 20th Feb. 1870. Of his numerous operas, operettas, and other compositions, produced in rapid succession from 1830, the most permanently successful have been *The Bohemian Girl* (1843), *The Rose of Castile*, and *Il Talismano* (1874). If Balfe was wanting in depth and dramatic force, he had a very thorough knowledge of effect and command of orchestral resources; and his compositions are distinguished by fluency, facility, and melodic power. Some of the defects of his operas may be justly attributed to 'Poet X', the theatrical manager, who at once wrote and translated the libretti, and put the operas on the stage. Many of Balfe's songs are admirable.

See Kenney's *Memoir of Balfe* (1875), and Barrett's *Balfe and his Works* (1882).

Balfour, THE RIGHT HON. ARTHUR, was born in 1848, and in 1856 succeeded his father in the estate of Whittinghame, Haddingtonshire. Educated at Eton and Trinity College, Cambridge, he entered parliament in 1874 as Conservative member for Hertford, and from 1878 to 1880 was private secretary to his uncle, Lord Salisbury, whom he accompanied to the Berlin Congress. For a while an unattached member of Lord Randolph Churchill's 'Fourth Party,' he led off the attack on the 'Kilmainham Treaty' (1882), negotiated with Lord Hartington the franchise compromise (1884), was returned for East Manchester (1885), and was appointed president of the local government board (1885), secretary for Scotland (1886), and chief-secretary for Ireland (1887-91), in which most difficult position he showed himself cool, clear-sighted, quick to think, speak, and act. In 1891 he became First Lord of the Treasury and leader of the House of Commons. His *Defence of Philosophic Doubt* (1879) is a clever application of scientific methods to science, its theme the irrationality of rationalism.—His brother, FRANCIS MALL- LAND BALFOUR, embryologist, was born at Edinburgh in 1851, and educated at Harrow and Trinity College, Cambridge, where he was elected to a fellowship. He soon entered upon researches on the development of the elasmobranch fishes, which threw new light on many problems of vertebrate morphology; and also took a leading part in the work of founding the then incipient Cambridge school of natural science. In 1878-83 appeared his well-known *Comparative Embryology*, upon which his fame chiefly rests. Besides receiving many scientific distinctions, and declining tempting offers from Oxford and Edinburgh, he was appointed to a special chair of Animal Morphology in 1882. But on the 19th July of that year he lost his life while attempting to climb one of the spurs of Mont Blanc. Besides his book, a research student-ship at Cambridge, which has already borne ample fruit, commemorates his name.

Balfour, SIR JAMES, Lord President of the Court of Session, was a son of Sir Michael Balfour of Montquhanie, Fife. In early life he was implicated in the plot against Cardinal Beaton, and on the surrender of the castle of St Andrews (1547) he was carried prisoner to France with John Knox. Two years later he purchased freedom by apostasy, and returning to Scotland, entered on that infamous career in which he 'served with all parties, deserted all, and yet profited by all.' We find him the recipient of favours under the regency, as he was under the queen—a privy councillor, commendator of the Priory of Pittenweem, clerk register, and finally Lord President of the Court of Session, with a pension of £500. When Morton was made regent, Balfour contrived to curry favour with him, and received from him a commission to make a general digest of the law. It is doubtful, however, how far the *Prædicts of Scots Law* that bears his name is really his; for, not feeling himself safe in Scotland, he left it for France, where he remained seven years (1573-80). He died in 1583.

Balfour, JOHN, of Kinloch, or of Burley, in Scott's *Old Mortality* was one of the chief actors in the assassination of Archbishop Sharp in 1679, for which his estate was forfeited, and a price set on his head. He fought at Drumclog and Bothwell Bridge, and is said afterwards to have escaped to Holland. By one account he died on a homeward voyage to Scotland, by another he never left the country, but settled in the parish of Roseneath, Dumbartonshire. Balfour of Kinloch is quite a different personage from Lord Balfour of Burleigh,

who succeeded to the title in 1663, spent his youth in France, and died in 1688.

Balfour, JOHN HUTTON, born in Edinburgh, September 15, 1808, graduated at the university of Edinburgh, and abandoning his intention of entering the church, took the degree of M.D. in 1831. From 1841 to 1845 he was professor of Botany at Glasgow University, and in the latter year succeeded to the same chair in Edinburgh, and was nominated regius keeper of the Royal Botanic Garden, the efficiency of which was greatly extended under his rule. In 1879, after being for thirty years dean of the medical faculty, he resigned these appointments, the universities of Edinburgh, Glasgow, and St Andrews conferring on him the degree of LL.D. He died at Edinburgh, February 11, 1884. Professor Balfour was for many years secretary of the Royal Society of Edinburgh, and was a member of numerous British and foreign learned societies. More eminent as a teacher than as an original investigator, he published a number of useful text-books and other works on Botany, including a *Manual*, *Class-book*, *Outlines*, and *Elements*, and contributed the article on that subject to the 8th and 9th editions of the *Encyclopædia Britannica*.

Balfrush (or more correctly BARFURUSH, 'mart of burdens'), a town in the Persian province of Mazanderan, on the river Blawal, 12 miles from its mouth in the Caspian Sea. The river is not navigated, all goods being landed at the port of Meshed-i-Ser, on the Caspian. Balfrush is a centre of trade between Russia and Persia, exporting large quantities of silk, rice, and cotton, while the Russians supply iron and naphtha. It has excellent bazaars, numerous caravanserais, and several Mohammedan colleges. The population is generally stated at 50,000, but some put it as low as 10,000.

Balguy, JOHN, a liberal divine, was born at Sheffield in 1686, and educated at St John's College, Cambridge. In 1718 he published two pamphlets in defence of Bishop Hoadley; his later works are defences of Dr Clarke's views against Shaftesbury, Tindal, and other deists. His *Essay on Redemption* (1711) showed a rationalistic tendency. Hoadley gave him a Salisbury prebend in 1727; and the chapter of Durham the Yorkshire vicarage of Northallerton in 1729. He died at Harrogate in 1748.

Bali, or LITTLE JAVA, one of the Sunda Islands, lying east of Java, about 75 miles long by 50 broad. Its area is 2300 sq. m.; pop. 760,000. A chain of mountains crosses the island from east to west, rising in the volcanic peak of Gunung-agung to 12,377 feet. Agriculture is the chief employment of the people. They grow rice, indigo, cotton, fruits, maize, and edible roots, and possess buffaloes and cattle. Fish are plentiful. Coffee is now exported in considerable quantity from Baleleng, the trading capital. The Balinese are a superior race, and speak a language related to Javanese. They excel as sculptors, and in working gold, silver, and iron. Their religion is Brahmanism of an ancient type, and they still keep up some of the cruel rites of the Hindus which have disappeared from India. Under the Dutch, the nine little principalities of the island are governed by native rulers. Chinese and a few Europeans are the chief traders.

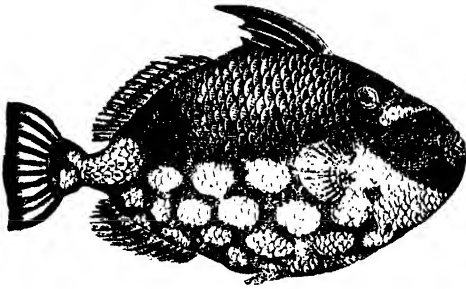
Balliol, an Anglo-Norman family that played a prominent part in Scottish history. Its founder, Guido or Guy, held Baillien, Harcourt, and other fiefs in Normandy, and from Rufus, whose father he had followed to England, received broad possessions in Durham and Northumberland. Bernard, his son, built the fortress of Barnard Castle; and his great-grandson, John, about 1263 founded Balliol College, Oxford. He died in 1269, and was

survived till 1290 by his widow, Devorguila, the daughter and co-heiress of Alan, Lord of Galloway, and the great-great-granddaughter of David I.—Their son, JOHN DE BALIOL, born in 1249, succeeded in her right to the lordship of Galloway, as well as to his father's vast possessions in England and Normandy. On the death of the Maid of Norway in 1290, he became a competitor for the crown of Scotland, and his claim was pronounced superior to that of the other principal competitor, Robert Bruce, Lord of Annandale. The arbiter was Edward I. of England, who found this a fit opportunity for asserting his claim as lord-paramount of Scotland. That claim was acknowledged by the Scottish Estates in submitting the contest to his decision; and, consistently with this ignominious submission, Baliol, before and after his coronation at Seone (1292), swore fealty to Edward as his feudal superior. He was soon made to feel that his sovereignty was merely nominal, and, abject as he had shown himself, the indignities which he experienced at length roused him to an assertion of his rights as king. In 1295 he took upon him, by the advice of his nobles, to conclude an alliance with France, then at war with England. This act of revolt was followed by speedy chastisement. Edward invaded Scotland with a large force; defeated the Scottish troops; took Baliol prisoner, and compelled him formally to surrender his crown, July 7, 1296. Baliol was confined for three years at Hertford and in the Tower, enjoying, however, a limited freedom and something of royal state. In 1302 he was permitted to retire to his estates in Normandy, where he died in 1315, the year after Bannockburn. The estimate by his subjects of this poor-spirited prince was significantly indicated by the nickname of 'Toom Tabard,' or Empty Jacket. EDWARD, his son, in 1332 made himself momentarily conspicuous in history by his daring and successful invasion of Scotland. Accompanied by the 'disinherited barons,' who were bent on recovering their forfeited Scottish estates, he landed with 3400 followers at Kinghorn in Fife; defeated the Earl of Fife; pushed boldly into the country; and at Dupplin Moor in Perthshire, on the night of 12th August, surprised and routed 30,000 men under the new regent Mar, who himself was slain, with 13,000 besides. On 24th September, seven weeks from the date of his landing, he was crowned king of Scotland at Seone. He had not enjoyed the kingly dignity for full three months, when he was surprised in his camp at Annan by Archibald Douglas, and nearly lost his life as well as the crown he had so recently assumed. His subsequent career is the very reverse of what might have been anticipated from so adventurous a beginning, being marked only by weakness, servility, and misfortune. He died near Doncaster in 1367, and with him ended the house of Baliol.

Balista. See BALLISTA.

Balis'tés, or FILE-FISH, a genus of bony fishes of the order Plectognathi (q.v.) of Cuvier; the type of a large family, Balistidae, the species of which are almost all inhabitants of tropical and subtropical seas, frequenting rocky coasts and coral-reefs. One species has been occasionally found on British coasts. Their colours are generally brilliant. The skeleton, as in the other Plectognathi, is in part gristly or cartilaginous, and the external covering of the body often resembles that of the Ganoid (q.v.) fishes, consisting, in some of the genera, of bony plates, disposed in regular rows, and not overlapping; in others, of very small rough scales, with stiff bristles, as densely crowded as the pile of velvet. The snout protrudes slightly, and the teeth are few, but well developed. But the most interesting thing in connection with these

fishes, is the provision for fixing the first dorsal spine in an erect position, or lowering it at the will of the animal. The spine is articulated by ring and bolt to a broad bony plate in connection with the backbone. 'When the spine is raised, a depression at the back part of its base receives a corresponding projection from the contiguous base of the second ray, which fixes it like the hammer of a gun-lock at full cock, and



Balistes conspicillum.

it cannot be let down until the small spine has been depressed, as by pulling the trigger; it is then received into a groove on the supporting plate, and offers no impediment to the progress of the fish through the water. This trigger-like fixing of the spine takes place also in the dead fish; and when a *Balistes* is removed from the bottle for examination, it is generally necessary to release the spine by pressing on the small trigger-ray. The fish is called at Rome *pescè balestra*, in reference to the resemblance between the principle of the above mechanism and that of the Roman dart-throwing engine, *ballista*. The first spine is roughened with enamel projections, whence the name File-fish. The flesh is unwholesome.

Balize. See BELIZE, HONDURAS.

Balkan Peninsula is a usual name for the peninsula in South-eastern Europe running southwards between the Adriatic and the Aegean. The most convenient northern boundary is the Save and the Lower Danube; though historically and politically Roumania and some parts of the Austrian dominions are closely associated with the regions south of the Danube. Greece is a peninsula upon a peninsula, but is not usually accounted one of the Balkan States. In a general way the Balkan Peninsula and Balkan States cover the area of Turkey in Europe and the non-Turkish States either now or lately under Turkish suzerainty, with the exception of Roumania and Greece. By its physical relief and general slope, the peninsula may be said to turn its back upon Europe. Its greatest elevations are found in the west and north-west, and all its waters, flowing north, east, and south, finally empty into the Black Sea or into the Aegean. The mountain chains and masses of the peninsula in no place form a regular system; spreading out from an apparent nucleus in the Etropol Balkans south-east of Sofia, in every direction, they are notable for their great variety of shape and richness of contour. The Balkans proper (ancient *Hemus*) form the boundary between Bulgaria and Eastern Roumelia. They are highest in the west, where the mean height is 6500 feet. The ridge is crossed by some 30 passes, of which the Shipka, between Kezanlik and Tirnova, and 4290 feet high, is the most noted in history—especially as the scene of severe fighting in the Russo-Turkish war of 1877-78. The mountain-chains in the west of the peninsula have a trend parallel to the shores of the Adriatic and

Ionian seas, whilst in the east, the chief ranges run at right angles to the Black Sea. The small though well-defined chain of the Rhodope (Despoto-Dagh) has a mean elevation of 5500 feet, and forms the water-parting between the Maritza Valley on the north and the Aegean on the south. Muss-alla (9500 feet), in the northern extremity of this range, is the culminating point of the northern portion of the peninsula, but the highest peak is Mount Olympus (9750 feet), north-east of the plain of Thessaly. There are several other ranges—the Dinaric Alps in the north-west, Pindus, between Albania and Thessaly, and the Little Balkans in Bulgaria, running north-east from the main chain; and peaks of from 5000 to 9000 feet occur in nearly every part of the peninsula.

The first place in the hydrographic systems of the peninsula must of course be given to the Danube. The Sea of Marmora receives only a few mountain-torrents, but the drainage area of the Aegean, or Archipelago, comprises the most important river-system of Turkey. The chief rivers—the Maritza, the Kara Su, the Vardar, the Indje—flow from the southern slopes of the Balkans and the crystalline masses of the Rhodope system. Lake Scutari and Lake Ochrida (the latter 2300 feet above sea-level) are the only ones of any size in the peninsula.

Ethnography.—The great highway of western emigration, the Balkan Peninsula still retains a great diversity of races. The oldest inhabitants of the peninsula—the Illyrians—have their representatives in the modern Albanians (Skipetar); the Greeks are there, and have kept their language; the Dacians, who adopted the Roman tongue, are the Rumanians or Roumanians of to-day. The Slavonic peoples are of course a large and important section of the population. Of the Thracian settlers, the Bulgars have become a thoroughly Slavonised people; and the Ottoman Turks, who first gained a footing in 1353, conquered nearly the whole of the peninsula before the close of the same century, reduced Greece to subjection between 1455 and 1473, and remained masters to the present century.

According to Reclus, the present territory of the peninsula may be divided into four ethnological zones: (1) Crete and the islands of the Archipelago, the seaboard of the Aegean, the eastern slope of Pindus and of Olympus, are peopled by Greeks; (2) the space comprised between the Adriatic and Pindus is the country of the Albanians (Skipetar); (3) on the NW. the region of the Illyrian Alps is occupied by Slavs, known under the different names of Serbs, Croats, Bosnians, Herzegovinians, and Chernagorians (Montenegrins); and (4) the two slopes of the Balkans proper, the Despoto-Dagh, and the plains of Eastern Turkey, belong to the Bulgarians a Slavonised Thracian people, now practically Slavs. The Turks themselves are scattered here and there in more or less considerable groups, chiefly round the cities and strongholds; but the only extensive tract of country of which they are, ethnologically speaking, the possessors, is the south-eastern angle of the peninsula. As to the relative numbers of these varied elements, there is considerable diversity of statement—each stock trying to prove its ethnic predominance in debatable ground. In 1885 the statistical bureau in Belgrade reckoned that in European Turkey (*without* Roumania, Serbia, or Montenegro) there were 1,362,000 Turks not pure Osmanli, but largely descended from renegade Greeks and Bulgarians; 1,137,000 Greeks; 1,011,000 Albanians, of whom 723,000 are Mohammedans; 200,000 Wallachians; 1,388,000 Serbs; 2,877,000 Bulgarians, of whom 860,000 are Mohammedans; 100,000 Armenians; 70,000 Jews; 104,000 Gipsies; and 144,000 Circassian immigrants.

The home of so many diverse races, the peninsula has long been a hotbed of warring interests, intertribal jealousy and intrigue, political tyranny and disturbance, and mutual maltreatment. The Turk's hand may summarily be said to be against every man's hand, and every other against the Turk. Greeks and Bulgarians intrigue each against the other with Russia, and look on the inheritance of the peninsula as exclusively theirs by right. Bulgarian and Serb, though cherishing the Slavonic name, met in the bloody campaign of 1885-86. Macedonia in especial is demanded alike by Greek, Bulgar and Serb. And the case is further complicated by the hostile faiths—Latin Christianity, Greek Church both Orthodox and United, and Mohammedanism. Hence it is easy to infer the last degree of unstable equilibrium in the political sphere, and to understand why the peninsula is a perpetual focus of the insoluble 'Eastern Question,' and a cause of disquietude to all the powers of Europe. Russia wars with Turkey; Austria and Russia have diametrically opposed interests as regards the Lower Danube, and in Austria itself, Hungarian and Slav take opposite sides as to the Southern Slavs; France and Britain are frequently in rivalry at the Porte; and the mutual suspicions of Russia and Britain are constant and notorious.

The following table, compiled from official returns, gives the area and population of the different parts of the Balkan Peninsula:

Political Divisions.	Area in English miles.	Population.
Immediate Possessions of Turkey in Europe.....	63,873	4,500,000
Bulgaria (tributary principality).....	24,699	2,007,919
Eastern Roumelia (autonomous province).....	13,861	976,100
Bosnia.....	23,577	1,336,091
Herzegovina..... (in the occupation of Austria-Hungary)		
Novi-Bazar.....	168,000	168,000
Total, Turkey in Europe.....	120,012	8,988,110
Servia (kingdom).....	18,757	1,902,419
Montenegro (principality).....	3,486	250,000
Total, Balkan Peninsula.....	148,255	11,140,529

Greece, with the aid of the Great Powers, obtained her independence in 1830, as also did Servia in 1830-67. Wallachia and Moldavia (now united in the kingdom of Rumania) were made tributary principalities by the Peace of Paris, 1856. Rumania and Servia obtained their complete independence by the Berlin Treaty of 1878—the former receiving the Dobruja in exchange for a portion of Bessarabia, which was restored to Russia; the latter having its area enlarged. The same treaty handed over to Austria-Hungary the administration of Bosnia and Herzegovina, and established the principality of Montenegro, the principality of Bulgaria, and the self-governing province of Eastern Roumelia. See Von Hahn, *The Struggle of the Bulgarians* (Eng. trans. 1886); De Laye, *La Péninsule des Balkans* (Eng. trans. 1887); Rustow, *La Question d'Orient* (trans. by Reynaud, 1887), and the articles in this work on TURKEY, GREECE, BULGARIA, &c.

Balkh, a district of Afghan Turkestan, the most northerly province of Afghanistan. It was for some time subject to the Khan of Bokhara. It corresponds to ancient Bactria, and lies between 35° and 37° N. lat., and 64° and 69° E. long. It is bounded on the N. by the river Oxus, on the E. by Badakhshan, on the S. by the Hindu-Kush, and on the W. by the desert. Offsets of the Hindu-Kush traverse it in a N.W. direction, and slope down to the low steppes of Bokhara. Its length is 250 miles; its breadth, 120. Its situation was once important during the overland commerce between India and Eastern Europe before the sea-

route by the Cape of Good Hope was followed. The soil has the general characteristics of a desert land; only a few parts are made fertile by artificial irrigation; and such are the vicissitudes of climate, that where grapes and apricots ripen in summer, and the mulberry-tree permits the cultivation of silk, in winter the frost is intense, and the snow lies deep on the ground. The natives are Uzbeqs (q.v.), whose character differs in different districts.

BALKH, long the chief town, situated in a district intersected by canals and ditches, by means of which the waters of the Balkh-ab, or Dehâs, are dissipated and prevented from flowing towards the Amu-Daria, only 45 miles distant. It is surrounded by a mud wall; but though bearing the imposing title of 'mother of cities,' it has not in recent times had any of the grandeur of ancient Bactra, on the site of which it is built. It was twice destroyed by Genghis Khan and Timur. A terrible outbreak of cholera in 1877 caused the capital of Afghan Turkestan to be transferred to Mazar, west of Balkh; since which Balkh has been an insignificant village. West of Balkh are the petty Uzbek states of Maimana, Andkhoi, Akcha, and Shiharghan, all absolutely ruled by Kalai, except Andkhoi; east of Balkh, between it and Badakhshan proper, are the towns and khanates of Kunduz and Khulm. All these Uzbek khanates are in the basin of the Amu-Daria, and together with Wakhan, east of Badakhshan, constitute Afghan Turkestan (see map of AFGHANISTAN).

Balkhash' (Kirghiz *Tengis*; Chinese *Sihai*), a great inland lake near the eastern borders of Russian Central Asia, between 44° and 47° N. lat., and 73° and 79° E. long. Lying 780 feet above sea-level, it extends 223 miles WSW.; its breadth at the west end is 50 miles, at the east from 9 to 4 miles; the area is 8400 sq. m. The water is clear, but intensely salt. Its principal feeder is the river Ili. It has no outlet. The northern edge is well defined; but the southern shores of the lake are labyrinths of islands, peninsulas, low sandhills, and strips of shallow water. Here grow masses of enormously tall reeds, in which wild swine shelter. To the south, stretching towards the base of the Ala-tan Mountains, is a vast steppe, almost devoid of vegetation. Balkhash seems to have at one time included in its immense area the smaller lakes Sossik-kul and Ala-kul, now far to the south-east. For the physical geography of this region, see ASIA.

Ball, JOHN, a priest who was one of the leaders in the rebellion of Wat Tyler (q.v.).

Ball, SIR ROBERT STAWELL, LL.D., F.R.S., astronomer, was born in Dublin, 1st July 1840, and studied at Trinity College. He was appointed Lord Rosse's astronomer at Parsonstown in 1865; professor of Applied Mathematics and Mechanics at the Royal Irish College of Science in 1873, and in 1874 professor of Astronomy at Dublin, and astronomer royal for Ireland. He has published works on mechanics and astronomy, of which the best known is *The Story of the Heavens*, besides many magazine articles, and is well known as a lecturer. He was knighted January 25, 1886.

Ball. Games with balls were among the most favourite gymnastic exercises of the ancients. They were played almost daily by all, young and old alike; by the highest statesman equally with the lowest of the people. The Greeks prized the game as a means of giving grace and elasticity to the figure; and in their gymnasia, as in the Roman baths, there was a special compartment for ball-playing, where certain rules and gradations of the exercise were to be observed according to the state of health of the player. The balls were of very various kinds; they were

generally of leather, and filled with air; others were stuffed with feathers. Ornamented balls, composed of twelve differently coloured segments (such probably as are to be seen in modern toy-shops), are mentioned in Plato's *Phædo*. There was great variety in the kinds of game, each having a name. In one, the ball was thrown up, and the players strove who would catch it as it fell; another was the same as our football; in a third, a number of persons threw it at one another, either with a view to hit, or for the ball to be caught and returned; in a fourth, the ball was kept rebounding between the earth and the palm of the player's hand as often as possible. Ball-playing seems to have been of equal antiquity in the west of Europe, and to have come down uninterruptedly to modern times. In the 16th century it was in great favour in the courts of princes, especially in Italy and France. Towards the end of the 18th century it went out of fashion in the higher circles of continental society, though it is still practised by the people in Italy and Spain, nowhere with more enthusiasm than among the Basques at the base of the Pyrenees. Forms of it, more or less practised, and all of them separately noticed, are *Base-ball*, *Cricket*, *Croquet*, *Fiers*, *Football*, *Golf*, *Lacrosse*, *Lawn-tennis*, *Polo*, &c.

Ball. See CARTRIDGE, SHOT.

Ballabgarh, a town of India, the former capital of a native state of the same name, in the Punjab, 21½ miles S. of Delhi. It contains a palace and several temples, and has a trade in food-grains. Pop. 7000.

Ballachu'lish, a village of Argyllshire, on the south shore of salt-water Loch Leven, 16½ miles S. of Fort-William. Its celebrated quarries of blue roofing clay-slate, commenced about 1760, employ some 600 men. The annual production amounts in a busy year to 17,000,000 roofing-slates, weighing about 30,000 tons. Pop. of the village (1881) 1019.

Ballad. The word ballad is derived through the medium of French from the late Latin *ballare*, 'to dance,' and thus meant originally a song sung to the rhythmic movement of a dancing chorus—a dramatic poem sung or acted in the dance, of which a kind of survival is seen in the ring-songs of children's games at the present day. Now the name is sometimes applied to a simple song, usually of a romantic or sentimental nature, in two or more verses, each sung to the same melody—a form the permanent popularity of which is proved by the crowded audiences at modern 'Ballad Concerts' in London and elsewhere. Such a ballad, as distinguished from a song, has something of the narrative or dramatic; and, however difficult it may be to bring to an exact definition examples on the border-line between the two, this distinction is not obsolete even in the musical world, in spite of modern looseness of phrase. But in literature the name ballad means more particularly a simple, spirited, narrative poem in short stanzas of two or four lines (without counting the burden or refrain), in which story is told in straightforward verse, often with great elaborateness and detail in incident, but always with graphic simplicity and force. The expression is marked by an artless naïveté and unconsciousness of art—it aims to be merely the perfect and living impress of the reality which it represents. Of all narrative and lyrical forms it is the simplest and most direct in its effect, in its power of representing to the imagination with vividness and truth incidents or natural emotions which it attempts to portray. It deals with the elemental human emotions, and its success as a literary form depends upon the potency with which these are sym-

thetically revived within the imagination of the hearer or the reader. It is obvious that such a form of literary expression is best fitted to a simple and unlettered age, and it is equally obvious that in an age of greater refinement and complexity in the conditions of social and intellectual life, it is difficult, if not impossible, for an artist so to divest himself of the effects of his environment as to reproduce it without affectation and unreality. And this is exactly what we find when we turn to contrast our traditional ballad poetry with the productions of the modern imitative school. Fine poetry though much of its work may be, we feel instinctively that it lacks the spontaneity and genuineness of the antique, the true simplicity born of the absence of self-consciousness—out of the singer's capacity for forgetting himself in his song. We can no more recover the naïveté of the early singers than the grown man can recover the simplicity of the child. But from singers who are wise enough to follow the analogy of nature in her continual advancement to new varieties from antecedent types, we may look for work which, while preserving the traditions of preceding times, will yet represent genuinely the spirit of its own, and save to us all the gains of culture and refinement which the generations have brought us, with something of the earnestness and reality of former days. Coleridge's *Rime of the Ancient Mariner*, Tennyson's *Revenge*, Browning's *Herre Riel*, and Rossetti's *King's Tragedy*, preserve the best traditions of the ballad, while they are as genuine nineteenth-century poems as *In Memoriam* or the *Ode to a Nightingale*.

Our traditional ballads, then, stand by themselves, and bear upon their face the best evidence of their age. Their makers were not authors by profession, and it is natural that their names should be forgotten. Of course, ballads may have been written by men of any class, especially at a time when all audiences were unlettered and alike in taste, and the possession of literary culture was not the separating line that it is at present. For example, the Spanish romances, which are indeed not a little exceptional, and to be distinguished from the ballads resembling ours still traditional in Spain, are clearly the work of men above the vulgar. Nowhere perhaps has there been a richer growth of really popular ballads than in Sicily, where Pitre tells us as many as seven thousand examples have already been gathered. Here the bulk of the population still stands at that ballad stage which in the evolution of our national culture we Englishmen have already left several generations behind us. Our ballads were made by the people for the people, and they went straight to the hearts of their hearers, who, if they lacked the refinement of their successors, were not less quick to feel the hot human emotions—love, hate, pity, and fear. They were versified originally by unlettered men for unlettered audiences; and passing as they did from mouth to mouth and generation to generation of reciters possessing the literary sense in very varying degrees, it is not wonderful that many changes of omission or alteration have slipped in, and that what are really the same ballads are found in versions differing considerably from each other. Personal tastes and prejudices would interfere, while accidentally discovered felicities of thought or phrase would often occur, and be added to the recited poems by individual reciters, so that it might be wondered at that the differences of versions are not much greater than they are. The ballads must have gained in strength in the course of transmission, as the happy changes would stand and live in the memory, while the feebler words and verses would fall aside and disappear. Molière's old housekeeper had as true a sense for felicity

of expression as the ladies of the court; so the instincts of the people guided the reciters to the choice of the best word, and when it was found, their memories retained it. But unfortunately the process of transmission has not always been synonymous with a process of refinement or improvement, but has often weakened and spoiled as well as strengthened and amended. Especially is this true with the ballads of the southern English folk, which too frequently are flat, spiritless, and didactic, totally unlike the Scottish and north-country English ballads. The reader cannot fail to be struck by this particularly in the Robin Hood ballads, where so much that is beautiful and artistic alternates awkwardly with the bald and prosy verbiage of the mere rhymester. 'The loyalty, good-humour, and the love of the free air and the green-wood remain, but the clerks have spoiled the praise of Robin Hood, the good outlaw.' Perhaps this is in great measure due to the early printing of much of the English popular poetry in the form of broad-sheets. These were subjected by half-educated editors and printers to a kind of preparation for the press which too often succeeded in stripping the poor ballads of almost all their poetic charm. The printed ballads were scattered broadcast over England, and often pasted on the walls of chambers in country-houses, where they were sometimes fortunate enough to catch the eye of a reader whose sympathies ranged wider than his culture. 'I cannot, for my heart,' says *The Spectator* (No. 85), 'leave a room before I have thoroughly studied the Walls of it, and examined several printed Papers which are usually pasted upon them;' and he describes further how that on a wall he found 'the old ballad of *The Two Children in the Wood*, which is one of the darling songs of the common people.' The people 'love a ballad but even too well, if it be doleful matter merrily set down, or a very pleasant thing indeed and sung lamentably,' and Mopsa's preference for a ballad in print, 'for then we are sure they are true,' may be taken as expressing a not uncommon popular feeling. Indeed the whole passage referred to (*Winter's Tale*, IV. iv. 181-330) throws great light on the subject of the old broadsides, and the warm liking of the people for them. These printed broadsides were long as dear a solace to the southern rustic as the traditional ballads were to his fathers, though by passing through a series of unintelligent and unsympathetic recensions many of them had become so bald as to deserve Dr Johnson's parody:

I put my hat upon my head, and went into the Strand,
And there I saw another man, with his hat in his hand.

In our traditional ballads we must not look for exact dates; but there is ample evidence that a large part of our traditional ballad poetry existed in much the same form as now, more than three hundred years ago. Many of the themes, of course, are much older, and undoubtedly many of the versified ballads also. Already in *The Vision of Piers Plowman* (Skent's ed., C. P. 138-139 viii. 10-12), in the second half of the 14th century, we find Robin Hood a hero of popular song. Sloth says:

Ieh can nouht parfyfiche lay, after-noste as the prest for segeth,
Ieh can rymes of Robyn Hode, and of Rimbolf, erl of Chester,
Ac of our lord ne of our ldy, the best that ever was makid.

Barbour tells us (*The Brui*, book xvi. 520-22, Skent's ed.; xi. 524-26, Jamieson's ed.) that he thinks it unnecessary to rehearse 'the account of a victory gained in Eskdale over the English, because:

For quha sa likes, that may beir
Young women, quhen they will play,
Syng it emang thame like day.

Leslie, in that chapter in his *History of Scotland* (1594) devoted to the Border manners, notices par-

ticularly the taste of the marchmen for music and ballad poetry. But we need not suppose that the only ballads they cared for were those of battle and bloodshed. Their rude and turbulent lives, full of danger and death, had in them the elements of rare romantic interest, and the pity of life must ever have been present to them as a rich artistic motive that would inspire the poetry of passion and pathos, of despair, or hopeless and interrupted love.

But our popular poetry was for generations the possession of the people alone: it was long before it attracted the notice of the learned at all. Shakespeare knew the old romantic ballads, and worked snatches of them with fine effect into his dramas. Sir Philip Sidney could say: 'I never heard the olde song of Percy and Douglas that I found not my heart moored more then with a Trumpet: and yet is it sung but by some blinde Crouder, with no rougher voyce, then rude stile.' Ben Jonson used to say he would rather have been the author of it than of all his works; and Addison commended the 'majestic simplicity' of the same ballad in two fine papers of his *Spectator* (70 and 74). Yet the ballads continued to be neglected, and it was not till Bishop Percy published his famous *Reliques of Ancient English Poetry* in 1765, that Englishmen awakened to the fact that their popular poetry was poetry at all. Among the ballads in this collection were such masterpieces as 'Child Waters,' 'Glasgerion,' 'Edom o' Gordon,' 'Edward, Edward,' 'The Jew's Daughter,' 'Old Robin of Portingale,' 'Sir Aldingar,' 'King Estmere,' 'Sir Patrick Spens,' and 'Gil Morice.' Percy admits in his preface that he had made 'a few slight corrections or additions,' as the old copies were 'often so defective and corrupted, that a scrupulous adherence to their wretched readings would only have exhibited unintelligible nonsense, or such poor meagre stuff as neither came from the bard nor was worthy the press.' Perhaps no book ever had a greater or more immediate effect. 'I do not think,' says Wordsworth, 'that there is an able writer in verse of the present day who would not be proud to acknowledge his obligation to the *Reliques*.' The same return to the simplicity of truth and nature took place about the same time in France and Germany, and ere long showed its results as plainly in the lyrical work of André Chenier, of Goethe, Schiller, and Heine. From the *Reliques* Scott drew directly the inspiration that made him a poet and more. In 1802 appeared at the provincial press of Kelso the first two volumes of his *Minstrelsy of the Scottish Border*, the richest single collection of popular poetry that has ever been published. From the publication of this book the northern ballads permanently took their place in public estimation as one of the best and purest sources of English poetry. It was fortunate for English literature that the Border ballads seemed, before it was too late, an editor in whom the antiquary had not drowned the poet. Many of the poems were the fruit of raid after raid into Liddesdale, and were in part actually taken down from the living lips of the old men and women who still knew them by heart. It may be regretted, from the point of view of the scientific student, that Scott did not print his texts exactly as he got them, but reference to his originals is possible in some cases, and shows us that Scott's changes—not always for the better—were not by any means so great as might be supposed. Of course, in many cases it is impossible now to say exactly how much they owe to the poetic touch of Scott himself, and we know that it was possible for him to be taken in by ingenious friends; still there is proof enough that here we have what is substantially a body of traditional poetry that fulfils the strictest

conditions of the ballad, and is yet of uncommonly high poetic value. The influence which Percy's and Scott's ballads have had on poetry is enough to prove their intrinsic poetic power: their straightforward diction and artless melody at once became a powerful influence in literature, and made themselves felt in the work of Coleridge, Wordsworth, Keats, Tennyson, Rossetti, and indeed every succeeding poet. Even the zeal of later imitative poetasters, however little according to knowledge, is a tribute to the poetic influence of the form that dominated them, although it did not save them from those faults of obscurity and quaint vagueness of expression, looseness of versification, and inaccuracy of accent, which not unfrequently accompany the merits of the model. Succeeding editors added to Scott's work, Robert Jamieson printing in his excellent collection in 1806 as many as fifteen ballads not before published: among them, 'Burd Helen,' 'Willie and May Margaret,' 'Young Beichan,' and 'Alison Gross.' Motherwell's originals, printed in 1827, were of less value, but many of his alternative oral versions were interesting and important, while his learned introduction contained a good survey of the subject, full of the indignant eloquence of the warm apologist, as well as the sympathetic insight of the poet. Peter Buchan's collection, published in 1828, professed to give north-of-Scotland popular versions, which were discovered to be strangely bald in style, and barren of poetic quality. In the hands of the later editors, the proportion of dross to ore grew larger with each collection, while the modern arts of life killed the conditions which propagated and preserved the ballad. The work of many of the later ballad editors showed no little erudition, though some evidently had more care for the cobweb than relish for the wine. Whether the incidents recorded are historical or legendary, or whether they are partly both; whether the ballads belong to the 16th, or 15th, or any particular century; whether Lady Wardlaw, or any one else, ever added a line, or left one out, are after all questions of but little moment to the Englishman proud of possessing the richest body of popular poetry in the world, and which bears upon its face, in the impossibility of its being imitated, the only evidence of genuineness and antiquity worth anything at all.

Still less important look the discussions of the editors in the light of the results gained from the comparative study of folk-songs. We find that many of our traditional ballads have the same tone, the same incidents, the same iterations of words and ideas as the traditional ballads of Scandinavia, of Greece, of Germany, of Italy, of France, and of Spain. This discovery widens our interest in the question enormously. It strips it of something of its parochial and national interest, but it adds an interest to it that is continuous with our civilisation itself. The plots and situations of many of our traditional folk-songs are the immemorial inheritance of Celts and Saxons, of Greek and Slavonic peoples of unknown and prehistoric antiquity. Like our folk-tales, they do not belong to one nation in particular, but are the property at least of all the peoples of the Aryan family. 'There are certain incidents,' says Mr Lang, 'like that of the return of the dead mother to her oppressed children; like the sudden recovery of a fickle bridegroom's heart by the patient affection of his first love; like the adventure of May Colvin with a lover who has slain seven women, and tries to slay her; like the story of the bride who pretends to be dead, that she may escape from a detested marriage, which are in all European countries the theme of popular song. Ballads, of course, have a narrower range than tales. There is here and there a trait common to Europe and Asia,

but the ballads are substantially European. Each nation has a set of its own—not always large—besides the stock in common. It is idle, then, to quarrel any longer over the origin and authorship of these ballads. It is still true, of course, that we have some more or less historical ballads, and that even our purely romantic and non-historical ballads have been powerfully modified by local influences; but the fact remains that a large number of our ballads, and many of their characteristic incidents and qualities, though not their literary style, are not due to the poetic instincts of our own countrymen in particular, but were carried scores of centuries ago in the memories of our distant progenitors from the primeval home of our race. They form part of the stock of primitive folk-lore, and a study of them on the comparative method may be expected to lead to important constructive results in the hands of future scholars. The materials for such study will be placed for the first time in the hands of every student on the completion of Professor Child's monumental edition of the *English and Scottish Popular Ballads* (Parts I. IV. 1882-86), with its learned and luminous introductions to each ballad, culled from a thousand volumes in every language of Europe.

But entirely apart from questions of origin, our popular ballads will repay the most diligent study on their literary side alone. As works of art in which a stock of primitive ideas and incidents has been preserved in poetic dress, they form a perennially valuable portion of our literature, and, as has been shown, they formed the chief factor in that naturalistic reaction from which has flowed the richest stream of nineteenth-century poetry, not yet exhausted after a hundred years. The Robin Hood cycle of ballads and the north-country and Border ballads are the two largest and richest collections of ballad poetry that remain to us; but as has been proved, the latter is infinitely the higher in lyrical quality. The Robin Hood ballads are some forty in number, but include much repetition both of phrase and incident. More than half a dozen are variants of the same story of Robin's meeting an unknown traveller—a tinker, butcher, tamer, shepherd, curtail friar, or beggar—straightway fighting with him, being beaten, and then, in good-humoured admiration of his antagonist's prowess, at once enlisting him in his band of honest outlaws. Among the best ballads of the group are 'Robin Hood and Guy of Gisborne' and 'Robin Hood and the Monk,' the last a good and right spirited heroic tale. The *Lytel Geste* is a set of eight connected ballads, grouped for us by some early and not unskilful editor. 'If these ballads as a whole be taken,' says Mr Allingham, 'the central figure (whithersoever or howsoever come) is a clear and delightful one, of that small class of ideal personages to which Don Quixote and Robinson Crusoe also belong—a bold, generous, and courteous outlaw, famous in archery, living under greenwood-tree with his merry men, taking from the rich and giving to the poor—a figure that, once lodged in the popular imagination, became an easy and favorite subject for one rhymester after another.' Of all our ballads, the palm for poetry must be given to those especially connected with Scottish and English Border life and story. These formed the richest part of Scott's collection, which contained altogether more than forty ballads never published before, among them such masterpieces as 'Thomas the Rhymer,' 'The Dowie Wens o' Yarrow,' 'The Wife of Usher's Well,' 'Annan Water,' 'The Douglas Tragedy,' 'The Lament of the Border Widow,' 'Clerk Saunders,' 'The Sang of the Outlaw Murray,' and 'Kinnmont Willie'; as well as good fresh versions of 'Lord Randal,' 'Helen of Kirkconnell,' 'Tamlane,' and 'The Lass o' Lochryan.'

'Kinnmont Willie' can hardly be overpraised as a masterpiece of the heroic ballad, unequalled in fire and speed. The reader is carried along in a whirl of sympathetic excitement, and is left no time to wonder at the marvellous fitness and truth of the words and images. Fighting ballads like this have high historical as well as poetical value, for they reflect closely and accurately the manners and life of the particular people who produced them; and doubtless they had their influence on the rude people who preserved them. The paradox of Fletcher of Salton occurs to the reader, and may be admitted to contain at least some measure of truth: 'I know a very wise man that believed that if a man were permitted to make all the ballads, he need not care who should make the laws of a nation.' Some of the fighting ballads of the Border are so vivid and vigorous that we feel the singer had himself ridden in the foray, had heard with his own ears the very clash of steel; nor indeed need the minstrel have struck a feebler blow because he had an ear for ballad metres. The old Border life was rough and rude, but the blood-stains on its grassy holms have watered for us flowers that are among the rarest in the garden of English song. Above all our ballads in value stand those that have clustered round the Yarrow—'fabulous as was ever Hydaspes.' Its story of love stronger than death has been one of the most potent charms in the world of English poetry, and has drawn some of the finest verse that has ever been written from Hamilton of Bangour, Logan, and Wordsworth.

The best collection of ballads, in all their varying versions, will be, when finished, Professor Child's great work; the best meantime is that of the same editor (8 vols. Boston, 1857-59). A good anthology, with a suggestive introduction, is that by William Allingham (1868); and a serviceable and comprehensive collection is *The Ballad Minstrelsy of Scotland, Romantic and Historical* (Glasgow, 1871). The most important individual collections have been: *A Collection of Old Ballads* (3 vols. Lond. 1723-25); Percy's *Reliques of Ancient English Poetry* (3 vols. 1765; a beautiful and excellent ed. by H. B. Wheatley, 3 vols. 1886); Herd's *Ancient and Modern Scottish Songs, Heroic Ballads, &c.* (1769; 2 vols. 1776); Johnson's *Scotts Musical Museum* (6 vols. 1787-93; 3d ed. by Stehouche and David Laing, 4 vols. 1853); Ritson's *Robin Hood, a Collection of all the Ancient Poems, Songs, and Ballads now extant, relative to that celebrated English Outlaw* (2 vols. 1795; re-edited by Gutch, *A Lytton Guide*, 2 vols. 1847); Scott's *Minstrelsy of the Scottish Border* (3 vols. 1802-3, with its admirable introduction and notes); Robert Jamieson's *Popular Ballads and Songs* (2 vol. 1806); Kinloch's *Ancient Scottish Ballads* (1827); and Motherwell's *Minstrelsy, Ancient and Modern* (1827), with an excellent introduction.

Other collections, but of less importance, are Thomas D'Urfey's *Pills to Purge Melancholy*, containing a ballad here and there (6 vols. 1719-20); Allan Ramsay's *Evergreen* (2 vols. 1724), and *Tea-table Miscellany* (3 vols. 1724-27; afterwards augmented with a fourth volume); Pinkerton's *Select Scottish Ballads* (2 vol., 1783); Ritson's *Select Collection of English Songs* (1783); *Pieces of Ancient Popular Poetry* (1791); *Ancient Songs and Ballads* (2 vols. 1792); and *Scottish Songs* (2 vols. 1794); Farley's *Scottish Historical and Romantic Ballads* (2 vols. 1808); Thomas Evans's *Old Ballads* (2 vols. 1777; enlarged ed. by R. H. Evans, 4 vols. 1784); Gilchrist's *Collection of Ancient and Modern Scottish Ballads* (2 vols. 1815); Hogg's *Jarvis's Relics* (2 vols. 1819-21); David Laing's *Select Remains of the Ancient Popular Poetry of Scotland* (1822); C. K. Sharpe's *Ballad Book* (1824); Macnair's *North Country Garland* (1824); Kinloch's *Ballad Book* (1827); P. Buchan's *Ancient Ballads and Songs of the North of Scotland* (2 vols. 1828); Dr Robert Chambers's *Scottish Ballads* (1829); Whitelaw's *Bones of Scottish Ballads* (1845); J. P. Collier's *Book of Roxburgh Ballads* (1847); Aytoun's *Scottish Ballads* (2 vols. 1857); and Maidment's *Scottish Ballads* (2 vols. 1868).

The publications of the Percy Society embraced 30 vols. (1840-52), a few of them pertaining to ballads. Indispensable books are Chappell's *Popular Music of the Olden Time* (2 vols. 1855-59), and Hales and Furnivall's reprint of the *Percy Folio Manuscript* (3 vols. 1867-68), in which we get behind the good bishop, and see his conception of an editor's duty, and how well on the whole he deserved the wrath of the surly but honest Ritson. It was a surprise to the world to discover that of his 180 ballads, there were only 45 that Percy had taken from his famous manuscript. In 1868 Mr Furnivall succeeded in founding the Ballad Society, which has since published, mainly under the enthusiastic and untiring editorship of Mr Ebsworth, the Bagford ballads, the Roxburgh ballads almost entire, and other unprinted collections. The great collection of ballads made by the famous Pepys still remains buried in the library of Magdalen College, Cambridge.

For comparative study may be named the following collections: For France, E. Rolland's *Recueil de Chansons Populaires* (6 vols. 1883-88); for Denmark, Svend Grundtvig's *Danmark's Gamle Folkeviser* (Copenhagen, 1853-90); for Germany, F. K. von Erlach's *Die Volkslieder der Deutschen* (5 vols. Mannheim, 1834); for Italy, Giuseppe Pitre's *Canti Popolari Siciliani* (2 vols. Palermo, 1870); and for Spain, Francisco Rodriguez Marin's *Cantos Populares Españoles* (Seville, 5 vols. 1882-84). See also Countess Martinegro-Cesaresco's *Essays in the Study of Folk-songs* (1886), and most of the sixty-nine books named in her list of books consulted.

See Alexander Smith's 'Scottish Ballads' in *Edinburgh Essays* (1856); Mr Hewlett's 'Modern Ballads' in the *Contemporary Review* for November 1875; Andrew Lang's article in vol. iii. (1875) of the 9th edition of the *Encyclopædia Britannica*, and his introduction to the selection of ballads in vol. i. (1880) of *The English Poets*, ed. by T. H. Ward; Professor Veitch's *History and Poetry of the Scottish Border* (1878), especially chap. x.; and chap. xiv. of John Russell's *History of Berwickshire* (1881), for an excellent survey of the social conditions of old Border life.

Ballade, a term applied to a poem consisting of one or more terns or triplets of seven- or eight-lined stanzas, each ending with the same line as refrain, and usually an envoy, as Chaucer's *Complaint of Venus* and *To his Purse*. The foregoing is the strict application of the term—it is now frequently used somewhat more loosely of any poem divided into stanzas of equal length. This form, which was a favourite of Villon and many of the older French poets, has been revived by De Burville, Swinburne, Andrew Lang, Austin Dobson, and other recent poets.

Ballanche, PIERRE SIMON, a French philosopher, was born at Lyons, 4th August 1776, and settled at Paris in 1814, having attracted some notice by his essays and a prize poem, *Antigone*. His great work is the *Palingenèse Sociale* (1828), in which he seeks to illustrate the workings of God in history, and sketch how human society may and will be reconstructed so as to attain to its highest development. His works are a strange mixture of mysticism, socialism, and the philosophy of history. His *Vision d'Hebel* (1832) is a prophetic forecast of the world's history, Hebel being a second-sighted chief of a Scottish clan. Ballanche, who was a member of the Academy, died 12th June 1847. See his *Life* by Ampère (1848).

Ballantine, JAMES (1808-77), artist and poet, born in Edinburgh, was brought up as a house-painter, but afterwards learned drawing under Sir William Allen, and was one of the first to revive the art of glass painting. He was commissioned to execute the stained-glass windows for the House of Lords, and in 1845 published a treatise on *Glass Staining*, which was translated into German. Two prose volumes, *The Gable-Window's Wallet* (1843), and *Miller of Deanhaugh* (1845), contain some of his best known songs and ballads. He was author of *Poems* (1856 and 1865); *One Hundred Songs with*

Music (1865); *Life of David Roberts, R.A.* (1866), and *Lilius Lee* (1871).

Ballantine, WILLIAM (1812-86), serjeant-at-law, son of W. Ballantine, for many years a magistrate at the Thames Police Court, was called to the bar in 1834, and soon obtained a large practice, chiefly in criminal cases. He was created a serjeant in 1856. Amongst the famous trials with which he was associated were the Müller murder trial, Tielborne case, and the defence of the Guicowar of Baroda. From the latter he is said to have received a fee of 20,000 guineas to induce him to visit India. See his *Experiences of a Barrister's Life* (1882); and his *Old World and the New* (1884), an account of a visit to America.

Ballantrae, a fishing-village at the mouth of the Stinchar, in the S. of Ayrshire, 10 miles WSW. of Pinwherry station on the Girvan and Portpatrick Railway. It is the headquarters of the south-west fishery district of Scotland. Fishing is largely carried on. Pop. (1871) 515; (1881) 742.

Ballantyne, JAMES (1772-1833) and **JOHN** (1774-1821), Scott's printers, were the sons of a merchant of Kelso, where in 1783 they were both at school with Sir Walter. James was bred for the law, but in 1797 he started the Tory *Kelso Mail*; and in 1802, having already printed some ballads for Scott, he produced the first two volumes of the *Border Minstrelsy*. The beauty of their typography established his fame as a printer; and towards the close of that year he removed, at Scott's suggestion, to Edinburgh, and set up two presses near Holyrood. In 1805 Scott became a secret partner in the business, which in 1808 expanded into the printing, publishing, and book-selling firm of John Ballantyne & Co., Scott having one-half share, and each of the brothers one-fourth. 'Aldiborontiphosphornio' and 'Rig-dum-funnidos' were Scott's nicknames for pompons James and sporting John; he seems to have liked them both, though sometimes he might plead 'For heaven's sake, treat me as a man, and not as a milch cow.' As early as 1813, bankruptcy threatened the firm, and though its unsaleable stock (Scott's own rash ventures mainly) was disposed of to Constable in 1818, it was hopelessly involved in Constable's ruin (1826). John had died bankrupt five years earlier; and James, after the settlement of affairs, was employed by the creditors' trustees in editing the *Weekly Journal*, and in the literary management of the printing-office. See works referred to under SCOTT; and *History of the Ballantyne Press* (Edin. 1871).

Ballantyne, ROBERT M., a prolific and popular writer of sound and wholesome tales for boys, was born at Edinburgh in 1825. His first book, issued in 1848, was a record of personal experiences during a six years' residence (1841-47) in the territories of the Hudson Bay Company. In 1856 he took to literature as a profession, making it his aim as far as possible to write from personal experience, and introducing interesting facts and descriptions. His first tales were founded on experiences in the backwoods of Rupert's Land, among the fur-traders and Red Indians; the *Lighthouse* was written after a short residence in the Bell Rock lighthouse; *Erling the Bold*, after a visit to Norway; and *The Settler and the Savage*, after a visit to the Cape. Up till January 1887 he had written and published 74 volumes, of which 62 were distinct tales.

Ballarat, or BALLARAT, a thriving Australian town, next in importance to Melbourne, in the province of Victoria. It owes its rise to the discovery of the gold-fields there in June 1851, being the oldest of the considerable gold-fields of Victoria,

and in fact the oldest but one of all the gold-fields of the colony. It is 100 miles WNW. of Melbourne, and 58 miles NW. of Geelong, with both of which it is connected by rail. It lies in the centre of one of the richest gold-fields in the world; the geological formation of the district is Silurian on primitive slate and sandstone. Ballarat, or Ballarat West, and Ballarat East, separated by the Jarrowee Creek River, are separate municipalities. The town is lighted with gas, well supplied with water, and has connection with all the other railways in the colony. It is the see of Protestant and Roman Catholic bishops. Many of the shops and public buildings are handsome, and there are more than 80 miles of made streets. Amongst the public buildings are several hospitals, mechanics' institute and library, free public library, city-hall, theatre, two town-halls, over 40 churches, two colleges, several grammar and denominational and many state schools, and 300 inns and hotels. Amongst the industries are iron-founding, brewing, distilling, with flour and woollen mills. Three daily newspapers are published. When the surface diggings became exhausted after the first rush in 1851, deposits of gold were found at greater depths, and now there are mines as deep as some of our English coal-pits, with steam pumping and all the requisite machinery. The miners in 1854 made a stand against unjust taxation, and in the conflict which ensued many lives were lost and much property was destroyed. The 'Welcome Nugget,' the largest ever found, was discovered in 1858 at Bakery Hill. It weighed 2217 oz. 16 dwt., and was sold for £10,500. The 'Lady Hotham,' found near Canadian Gully, weighed 1158 oz. 2 dwt. In 1886 about 7000 men were employed at the gold-fields, 1000 of whom were Chinese. The surrounding district is well adapted for farming and sheep-breeding. Pop. (1881) Ballarat, 22,411; Ballarat East, 11,849; total, 37,260.

Ballast is a heavy substance employed to give a ship sufficient immersion in the water, to insure her safe sailing with spread canvas, when her cargo and equipment are too light. The amount of ballast required by a ship depends not only on her size and cargo, but also on her build; some forms of construction requiring more ballast than others. It is not merely the *quantity* of ballast which a skilful shipmaster has to consider; he is required also to take into account its *distribution*. If a heavy mass of ballast be deposited within a small compass near the keel, it locates the centre of gravity very low down, in which circumstances the ship will sail sluggishly, and heavy and uneasy rolling may result, causing discomfort, and engendering severe strains in the hull and rigging. If, on the other hand, the ballast be massed too high up, the ship becomes unstable or 'crank,' and cannot carry much sail without danger of being upset.

In ballasting a ship, the cargo and ballast are considered together, the quantity and distribution of the latter being made dependent on the former. In a ship of war, the ballast is made subservient to the requirements of the necessary stores and war *matériel*; in a merchant or passenger vessel, to the efficient storage of the cargo and the comfort of its passengers.

The substances used as ballast are various—chiefly iron, stone, gravel, sand, and water. In ships of any considerable size, or engaged in any service of importance, iron has long superseded stone, gravel, or other variety of dry ballast, but within recent years the adoption of water ballast has become very general in almost all classes of vessels. Its first application, about the beginning of the century, in the ships engaged in the coal-trade between the Tyne and London,

consisted in the use of waterproof bags arranged on the floor of the vessel, which were filled or emptied as circumstances demanded, by pump and hose. When steamers began to be employed in the trade, special ballast tanks, forming part of the vessel's structure, were introduced, which served for cargo carrying, when the vessel was loaded and not requiring ballast. This developed into using the whole extent of a vessel's bottom exclusively for water ballast, a second or inner bottom being fitted two or three feet above the bottom proper. The practice of fitting vessels with double bottoms, divided into cellular spaces by continuous longitudinal keelsons and transverse bracket floors—of which the *Great Eastern* is an early and notable example—had been instituted by Mr. Geo. Russell between 1850–58. The object then in view, however, was that of enhanced structural strength, but about 1874–78 several vessels were built on the north-east coast of England on the cellular-bottom system, the end in view being chiefly the carriage of water ballast. From that time the system has been continuously and increasingly adopted, its later development having been more closely associated with Clyde-built vessels. Steamers only, for a time, were thus constructed, because of the special pumping facilities they possessed for rapidly emptying the ballast tanks. Within very recent times, however, many sailing-ships have been built with water-ballast bottoms; the presence of steam donkey-boilers, cargo winches, windlass, &c., in well equipped modern ships, incidentally furthering the adoption of water ballast. The bottoms of typical modern merchant-steamers are divided into numerous watertight compartments, which can be filled or emptied separately through inlet or suction pipes, by means of pumps worked by the main engines. The system has many advantages which highly commend it. Vessels are ballasted automatically, without any manual intervention further than the opening and closing of the inlet valves. Ballasting may proceed simultaneously with the discharge of cargo, and quite irrespective of that work. It may be discharged also at any time, even while the vessel is under way. The subdivision of the bottom into self-contained compartments admits of ballasting being done either at the fore or the aft end of the vessel, just as may be required for its equal or desired trim. The inner bottom, it may be stated, adds immensely to the safety of the vessel in the event of its striking on sunken rocks.

The customs laws relieve merchant-ships from certain formalities and payments when leaving a port in ballast. To prevent captains from filling up or injuring the entrances to rivers, ports, havens, and roadsteads by the discharge of ballast, regulations have been made at most places for its disposal.

The term ballast is employed by civil engineers to signify the broken stone, cinders, or gravelly material which is laid as a packing between railway sleepers, in order to give them solidity, and at the same time prevent the lodgment of water. No English railway is considered to be complete or safe for transit until it is dressed and finished by ballasting; the bed of ballast being usually about two feet thick. The possibility of procuring ballast at a cheap rate, considerably affects the cost of railway undertakings.

Ballater, a village of Aberdeenshire, Scotland, on the banks of the Dee, 43½ miles WSW. of Aberdeen by rail. It is the resort of numerous visitors, on account of the medicinal springs of Pannanich in the vicinity. Balmoral Castle, the Scottish residence of Queen Victoria, and Ballalrich Farm, connected with the boyhood

of Byron, are in the neighbourhood. It is the terminus of the Deeside extension of the Great North of Scotland Railway, and is a clean and pleasant village, with an Albert memorial hall, two churches, and barracks for the Queen's guard of honour. Pop. (1881) 759.

Ballenstedt, a town in the duchy of Anhalt, in the eastern part of the Harz Mountains, 7 miles SE. of Quedlinburg by rail. The castle, overlooking the town, was a monastery from 940 till 1525, and from 1765 till 1863 the residence of the dukes of Anhalt-Bernburg. Pop. (1885) 4852.

Balleny Islands, a group of five small volcanic islands discovered in the Antarctic Ocean, 1839, nearly on the Antarctic circle, and in long. 164° E. One contains a very lofty mountain.

Ballet (Fr. *ballet*; Ital. *ballo*, from late Lat. *ballare*, 'to dance,' possibly connected with late Greek *ballizein*, 'to throw the legs about, to dance'), a theatrical exhibition, composed of dancing, posturing, and pantomimic action. Both the religious ceremonies of the Greeks, and the dramatic representations which sprang from them, were largely intermingled with dancing (q.v.); and the Roman pantomimes bore a strong resemblance to our *Ballet d'Action*. In an entertainment given to celebrate the victory of Actium, the *Trachiniae* of Sophocles, and an erotic interlude founded on the myth of Leda, were performed in dumb show, the dancers Pylades and Bathyllus taking the leading parts; and the whole wound up with a Pyrrhic war dance. Some tradition of this form of entertainment, doubtless, suggested the courtly dances which became fashionable in the early days of the Renaissance. The first on record was that given by Bergonzio di Botta, at Tortona, to celebrate the marriage of the Duke of Milan, in 1489, which was famous throughout the civilised world. From that time great events, such as royal marriages and births, were celebrated by grand productions of ballet on which enormous sums of money were lavished. These ballets were frequently historical in subject, treating of the *Sage of Troy*, the *Conquests of Alexander*, and similar events. There were also mythological, poetical, moral, and fantastic ballets, on such subjects as the *Judgment of Paris*, the *Seasons*, *Truth*, the *Diversions of the Carnival*, &c. All of these were in five acts, each of which consisted of three, six, nine, or twelve entries, and in all of them singing and recitation mingled with the dancing. Catherine de Medici introduced the ballet into France, and encouraged lascivious dances by females to distract the attention of her son, Henry III., from state affairs. At this time Baltasarini introduced a certain regularity into this kind of spectacle, his most famous production being the *Ballet Comique de la Reine*, danced at the marriage of the Duc de Joyeuse in 1581. Henry IV. was a great supporter of the ballet, no fewer than eighty grand entertainments being given by him between 1589 and 1610. Louis XIII. and Louis XIV. carried their love of ballet to an extreme length, and themselves danced publicly. In 1661 the latter founded an Academy of the Dance, with Quinault as director, and Lully as composer. Quinault introduced considerable changes into the ballet, for he, being a poet, subordinated the dancing to the recitation and singing. It was not till 1681 that female dancers appeared in public, the first being four ladies, who danced in *La Triomphe de l'Amour*. In the early part of the 18th century we begin to meet with the names of professional female dancers, two of the most famous being Mlles Sallé and Camargo, immortalised by Voltaire, the former of whom visited London in 1741, and apparently created a great sensation. The great male dancer of this time was Dupré,

the predecessor of the universally known *Gaetano Vestris*. In 1697 De la Motte introduced some changes into the ballet, chiefly in the direction of more interesting subjects, and about the same time comic ballets were invented by Danchet; but no important alteration was made till the advent of Jean George Noverre in 1749. In his works, Noverre describes the conditions under which the dancers at this time performed. They wore masks, huge wigs and head-dresses, and, most extraordinary of all, hoops. The mask held its place till 1772, when Maximilian Gardel, a famous dancer, ventured to appear without one. Public conservatism caused a return to the old fashion for some months, but in 1773 the mask disappeared for ever. Noverre completely revolutionised the ballet. Hitherto the form had remained practically unchanged; each act being performed by different dancers, and, generally, in different styles of dancing. Noverre invented the *Ballet d'Action*, and revived the true art of pantomime. Dancing, which had previously been principally an exhibition of agility, now had dramatic meaning, and the most intricate plots were represented by pantomime alone. The principles of Noverre were carried to great perfection by Vincenzo Galeotti in Copenhagen, and by his successor Bonnonville. Under the Directory a form of grand ballet was revived, in which patriotic songs were a distinctive feature; *La Marseillaise* being the title of one great ballet. But it cannot be said that the form introduced by Noverre has been improved or even much altered, and the history of the ballet since his time is a history of dancers, rather than of dancing. In England this class of entertainment has never been more than an exotic, and has practically no history. The word *ballette* is first used in English by Dryden (1667), and the earliest attempt at a descriptive ballet seems to have been *The Tavern Bickers*, played at Drury Lane in 1702. It is worthy of note that within the last few years an important revival of the ballet has taken place in Italy, where the famous *Eccelsior*, by the Chevalier Luigi Manzotti, *Messalina*, *Amor*, &c., have furnished magnificent examples of the *Ballet d'Action*.

Ball-flower, so named from its resembling a ball placed in a circular flower; an ornament peculiar to the decorated style of Gothic architecture which prevailed in the 14th century. The ball-flower is supposed by some to be an imitation of a pomegranate, by others of a hawk's bell. Its form



Ball-flower.

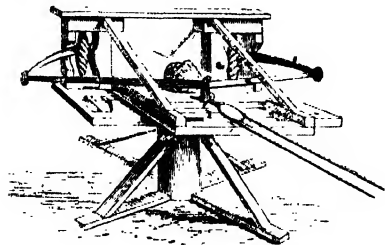
will be better understood from the illustration.

Ballina', a seaport town on the confines of counties Sligo and Mayo, Ireland, on the tidal Moy, 7 miles S. of its entrance into Killala Bay, and 168 miles NW. of Dublin by rail. Ballina proper is on the Mayo side, the Sligo and larger portion being a suburb called Ardara in which are the Protestant church and Roman Catholic cathedral (that of the Bishop of Killala). Ballina is the first town in County Mayo, and has a trade in agricultural produce. Many anglers resort to the river Moy and Lough Conn. In 1798 the French landed, and took Ballina, but were three weeks afterwards defeated at Killala. Pop. (1871) 5551; (1881) 5760.

Ballinasloe', a small town in Connaught on the borders of counties Galway and Roscommon, on both sides of the river Suck, 94 miles W. of Dublin. A fair in October is one of the largest in the kingdom. Pop. (1881) 4772.

Ballinrobe', a small town of Ireland, County Mayo, picturesquely seated on the Robe, 17 miles SSE. of Castlebar. Pop. (1881) 2286.

Ballista, or **BALISTA** (Gr. *ballein*, 'to throw'), a Roman military engine, resembling a huge bow, which, like the *catapulta* and the *onager*, propelled large and heavy missiles, chiefly through the reaction of a tightly-twisted rope of hemp, flax, catgut, sinew, or hair, or else by a violent



Ballista.

movement of levers. Numerous weapons of an analogous character were known in the middle ages—such as the *mangonel*; the *trebuchet*, the *robinet*, which threw darts as well as stones; the *tricole*, which hurled quarrels, or square-headed arrows; the *espringal* or *springal*, which threw large darts, &c. The *Arbalest*, or *Crossbow* (q.v.) may be regarded as a small portable arrow-throwing ballista.

Ballistic Pendulum. An instrument so named was invented by Benjamin Robins (q.v.) about 1742, to ascertain the speed of projectiles, and to prove the quality of gunpowder. It consists of a large block of wood suspended from a strong horizontal axis; and it is so solidly constructed as to bear a very heavy blow from a shot without injury. An excavated centre on one side of the block is filled with sand, packed in leather upon an iron frame; four bags form a filling or core. The core, forming the place of impact, is easily replaced after each firing. Straps of wrought iron suspend the block from the wrought-iron axis or shaft. The shaft-ends have knife-edges, which rest on V supports. The construction is such that a violent percussion makes only a very slight oscillatory movement in the block. A brass graduated limb measures the arc of vibration; and a brass slide is pushed forward by an index attached to a bar connected with the suspension straps. Another form of instrument for similar purposes is described under *EPILOVETTE*. For *ballistics*, the science of missiles, see *GUNNERY*, and *PROJECTILE*.

Ballium. See *BAILEY*.

Balloon (Fr. *ballon*, 'a large ball'). According to the principle of Archimedes (q.v.), bodies immersed in a fluid are buoyed upwards with a force equivalent to the weight of the fluid displaced by them. If their own weight is not sufficient to counterbalance this force—that is, if they are lighter than the fluid—they rise upwards with a force equal to the difference between the weight of the displaced fluid and their own weight. A balloon, therefore, which consists of an integument inclosing a gas within it, will rise in air in the same way that a cork rises in water, provided that the weight of the whole be less than that of an equal volume of air. If one, for instance, occupy as much space as 1000 lb. of air, but weigh itself—covering, gas, and appendages—600 lb., it will be impelled upwards with a force of 400 lb. The gases employed for filling balloons are either hydrogen or ordinary coal-gas. The former, when

pure, is between fourteen and fifteen times lighter than atmospheric air, and the latter generally about two and a half.

Construction.—A balloon of the common type (fig. 1) is best made of silk, but owing to its cost, either alpaca or cotton is more usually employed. The pieces or gores are sewn together, and the whole varnished to prevent the escape of gas. At the top there is a valve made of wood, from 1 to 3

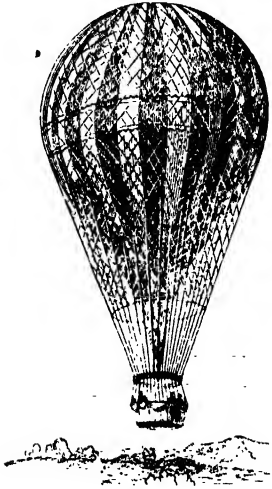


Fig. 1.—Common form of Balloon.

feet in diameter. This is kept close by a spring, but it can be opened at will by a valve-line which descends through the interior of the balloon by its neck or mouth to the ear. M. Giffard's valve, which is liked by some aeronauts, consists of a metallic disc pressed against a wooden hoop by 16 steel springs. A network of cord extends from the circumference of the valve over the surface of the balloon, and supports the hoop from which the ear is suspended by six or more strong ropes about 4 or 5 feet long. These ropes require to be carefully adjusted so as not to strain the network. Through inattention to this, a silk balloon tore at Paris, in July 1882, when about 2300 feet above the ground. The furniture of the ear is ballast or sand-bags; the barometer, and other scientific instruments; and the grappling-iron, tied to the end of a long rope, for anchoring the balloon at the descent. The aeronaut has, until very recently, had at his disposal the means of guiding his air-ship only in an upward or downward direction, the motion of translation being wholly dependent on the wind by which it is borne. If he wishes to ascend, he throws some of the ballast over the side of the ear; and if to descend, he pulls the valve-rope, so that the gas rushing by virtue of its specific lightness through the passage made for it by the open valve, the buoyant material may be lessened. It is evident that the power of thus directing his machine becomes more limited with each exercise of it, for in each case there is an unrepaid loss of the means necessary. In ordinary flights, the mouth of the balloon is left open, so that there is no danger of explosion arising from the expansion of the gas in the rarer regions of the atmosphere. The diffusion that takes place through the open neck is inconsiderable during the few hours that an aerial voyage lasts. Early aeronauts, who kept their balloons closed, frequently ran considerable risk by inattention to the

valve when the imprisoned gas demanded vent for its expansion. Small pilot balloons are often made of thin india-rubber, and still smaller ones of gold-beaters' skin. Those generally used at illuminations are made of thin oiled or waxed paper. Very small balloons have been sometimes usefully employed in experimenting on the ventilation of large halls to show the directions of currents of air. The balloon is usually spherical in shape, more or less modified, but sometimes it is ellipsoidal, or approaches a lenticular form, and at others it is somewhat like a cigar in shape. Controllable balloons are usually elongated.

History.—The earliest attempts by man to rise in the air were no doubt made by the use of some kind or kinds of artificial wings (see FLIGHT). The art of traversing the air by means of balloons, generally called Aëronautics, and sometimes Aërostation, is of comparatively recent date. The French missionary Basson, writing in 1694, says that a balloon ascended at the coronation of Fo Kien at Peking in 1306. There is, however, reason to believe that the first balloonist was Padre Guzman, who made an ascent at Lisbon in 1709, using heated air. But the germ of the invention of gas-balloons is to be found in the discovery by Cavendish, in 1766, of the remarkable lightness of hydrogen gas, then called inflammable air. Professor Black, of Edinburgh, seems to have been the first who conceived, in 1767, the idea that a light envelope containing this gas would rise of itself, and is said to have tried the experiment. Cavallo, in 1772, made an unsuccessful attempt to raise swine's bladders and paper-bags with hydrogen, but he succeeded in raising soap-bubbles inflated with the gas. The invention of the balloon is usually ascribed to the two brothers Stephen and Joseph Montgolfier, paper-makers at Annonay, in France, whose names are as distinguished in the development of their own branch of manufacture as in the history of aeronautics. It immediately struck these brothers, on reading Cavendish's *Different Kinds of Air*, that by inclosing a light gas within a covering of inconsiderable weight one would be able to navigate the air. Being paper makers, they naturally fixed upon paper as the most fitting material for the purpose, and first attempted to make balloons of paper filled with hydrogen. Finding that this gas quickly escaped, they sought for another kind, and tried the gas resulting from the combustion of straw and wool, thinking that heat gave it an upward tendency, and that its electrical properties caused it to be repelled from the ground. The failures, of course, arose from the use of a paper envelope. At Avignon, in November 1782, Stephen Montgolfier first succeeded in causing a silk parallelopiped, of about 50 cubic feet, to rise to the roof of a room. Encouraged by this success, the brothers made experiments on a larger scale at Annonay with an equally happy result; and finally, in June 1783, they raised a balloon, 35 feet in diameter, to a height of 1500 feet. This last, nearly spherical in shape, was made of paeckcloth, covered with paper, and was heated by an iron chafin placed beneath it, in which ten pounds of moist straw and wool were burned.

The news of this extraordinary experiment soon reached Paris, where it produced a most lively impression. Such was the excitement that a sufficient subscription was filled in a few days to repeat the Annonay experiment, and the construction of the balloon was intrusted to the brothers Robert, famous philosophical instrument makers of the day, and to Professor Charles, a young but experienced physicist. Charles fixed upon hydrogen instead of Montgolfier gas for his balloon. By ingenuity and perseverance combined, he triumphed

over the difficulty, then very great, of filling a silk globe, as large as 12 feet in diameter, with this light gas. This balloon was transferred to the Champs de Mars, the largest open space in Paris, where, on the 27th of August 1783, it ascended in the presence of 300,000 spectators, half the population of the city. At the instance of the commission already referred to, Stephen Montgolfier constructed a fire-balloon, 72 feet high, and 41 feet in diameter. It ascended before the commission on the 12th of September 1783, but being held captive, it was much injured by a violent wind, which blew at the time, and after it descended it was finally broken up by heavy rains. Joseph Montgolfier sent up a balloon at Versailles seven days later, carrying a cage with a sheep, a cock, and a duck. These were the first aerial travellers.

The balloon was now a *fait accompli*, and it began to be seriously discussed whether it might not be serviceable as an air-ship for bearing men aloft as passengers. The solution of this question was first given by Pilâtre des Rosiers. In a Montgolfière, as the heated-air balloon was called, 74 feet high, and 48 feet in diameter, supporting at its base a gallery of wicker-work, he, in company with the Marquis d'Arlands, made the first aerial voyage in a free balloon, 21st November 1783. They remained in the air twenty-five minutes, and sailed across the Seine and over a considerable part of Paris. The year 1783, so fertile in the annals of aërostation, did not pass away without witnessing a greater triumph. On the 1st of December, Professor Charles, along with Robert, rose from the Tuileries gardens with a hydrogen balloon—then called a *Charlière*—made from the proceeds of a public subscription. This balloon was made of alternately red and yellow gores of silk sewed together, and coated with caoutchouc varnish. It was covered with a net which supported the car, and was furnished with a valve, a barometer, and sand-ballast, and was, in fact, a complete aerial machine, no essential change or improvement on which took place for a hundred years. Before fire-balloons became obsolete, several remarkable voyages were made in them. The same Pilâtre des Rosiers made 30 leagues in one of them, the longest voyage ever executed in a *Montgolfière*. Mr J. Tytler made the first balloon ascent from British soil from the Comely Gardens, Edinburgh, on August 27, 1784. Lunardi made an ascent at London a few days later—viz. on 15th September 1784. J. P. Blanchard, along with the American Dr Jeffries, crossed the English Channel from Dover to Calais in circumstances of almost unparalleled danger, January 7, 1785. Garnerin first descended from a balloon by a Parachute (q.v.), October 22, 1797. The first aëronaut, Pilâtre des Rosiers, fell a victim to a blind devotion to his art. Having constructed a compound machine, consisting of a hydrogen balloon above and a Montgolfière below, and started from Boulogne on the 5th of June 1785, he had not ascended many minutes, when, on attempting to open the valve of the hydrogen balloon, he caused a rent of several yards in it, so that it emptied itself almost immediately, and fell on the Montgolfière beneath. The fire in the latter not being kindled, the whole machine fell with frightful rapidity to the earth, and the ill-fated aëronauts perished on the spot. The introduction of coal-gas, instead of hydrogen, by Mr Green, is the most important advance in aërostation since the earliest days of the art. His large coal-gas balloon, in 1836, bore Messrs Green, Holland, and Mason from London to Weilburg, in Nassau, distant 500 miles, in 18 hours.

Scientific Results.—Balloons have been enlisted on behalf of science. The first ascent for scientific

objects was made at Hamburg, July 18, 1803, by Robertson and Lhoest, and a notable one by Gay-Lussac, who, on 16th September 1804, rose to the height of 23,000 feet. Later scientific ascents were made by Humboldt in America; by Mr Rush and Mr Green in 1847-49; and by MM. Barral and Bixio at Paris in 1850. The most important ascents for this purpose were those made by Mr Glaisher between 1862 and 1866. He went up 28 times, and 11 of these ascents were made, like those of Mr Rush, on behalf of the British Association. Mr Glaisher found that the rate of decline of temperature with elevation, near the earth, differed much according to whether the sky was clear or cloudy. At the height of 5 miles cirrus clouds were seen apparently yet another 5 miles up, suggesting that their presence at anything like this elevation can hardly be due to moisture at all. The time of vibration of a horizontal magnet was found to be longer high in the air than on the earth. In nearly every ascent, currents of air in different directions were passed through. Sometimes the direction of the wind was the same for only 500 feet above the earth, while at other times it did not change till a height of 20,000 feet was reached. In some of the voyages directly opposite currents were met with at different elevations. As regards physiological observations, Mr Glaisher found that his own pulsations were 76 before starting, and 110 at greater elevations than 20,000 feet. The faces of some persons became glowing purple when up 10,000 feet, while others showed no change. In a balloon the voyager has usually no sensation of motion. Observations made by M. Flammarion in eight or nine ascents from Paris in 1867 and 1868, confirmed for the most part Mr Glaisher's results. Some interesting instantaneous photographs have been taken from balloons in France.

High Ascents.—An ascent of fully 7 miles was made from Wolverhampton, September 5, 1862, by Messrs Glaisher and Coxwell, which is the highest on record. At this great height the cold was intense, the thermometer standing at -12°F . The barometer fell to 7 inches, as compared with 29 at the surface of the earth. When the balloon was 29,000 feet high, Mr Glaisher became insensible, and remained so for seven minutes. Mr Coxwell, at this height, had to mount into the ring to adjust the valve-line, when his hands became frozen, and he had to open the valve by seizing the line with his teeth. He too was very nearly insensible. Up to the height of 5 miles the aëronauts experienced no difficulty in breathing, except when some exertion had to be made. Perfect stillness and silence reigns 6 miles above the earth, but a railway train in motion can be heard at a height of 4 miles. In this ascent the aëronauts passed through a cloud saturated with moisture, about 1100 feet in thickness, entering it one mile above the earth. On another occasion, in the same year, they passed through a similar, or perhaps still denser cloud, during the descent, in which case the balloon collected weight by the condensation of moist vapour, that notwithstanding all attempts to lighten it, the car on coming to earth received a shock sufficient to break nearly all the instruments.

A remarkable but disastrous ascent was made from the gas-works of La Villette, Paris, on the 15th April 1875. Three aëronauts were in the car of the balloon, which reached the height of 5½ miles. Of the three, Gaston Tissandier alone survived. The two others, Sivel and Crocé-Spinelli, lost their lives when high in the air, either by suffocation from the escape of gas, or from the vertigo of high regions. Tissandier had been unconscious for some time as well as his companions. On the 13th August 1887 another ascent was made from the

same place. This time the aéronauts were M. Mallet and Captain Jovis. They did not attain a greater height than $4\frac{1}{2}$ miles, and yet M. Mallet was twice seized with a fainting fit, but his companion felt no inconvenience.

Balloons in War.—In 1794, during the wars of the Revolution, an ærostatic institution was formed at Mendon, near Paris, for training a corps of 'aëroliers,' in order to observe the enemy by means of balloons. One under the management of this corps was used at the battle of Fleurus, near Charleroi, fought against the Austrians. Reconnaissances were made by use of the balloon in the Italian War of 1859, and in the American civil war. During the siege of Paris, 1870-71, the balloon was extensively employed. Nearly 2,500,000 letters and post-cards, besides several persons (including Gambetta), left the beleaguered city in balloons. There was, of course, no attempt made to come back in such a conveyance; carrier-pigeons were the return messengers. The balloon called the *Ville d'Orléans*, which left Paris on November 21, 1870, descended 15 hours afterwards, near Christiania, in Norway. One supposed to be lost was found long afterwards in Iceland. The balloon was used at Suakin in March 1885, which was the first instance of its being employed by a British force in war. It has been suggested that dynamite might be thrown at an enemy from balloons. In 1887 the British War Department conducted a series of experiments at Chatham on the use of captive balloons for observations; and in July 1886, Mr Eric S. Bruce applied electricity to a captive balloon, so that signals might be flashed in it by an operation on the ground.

Captive Balloons. A captive balloon is held by a rope to a windlass on the ground. The use of these for military purposes has already been referred to. It is not safe to use them in a stiff breeze. A very large captive balloon was used to make ascents from the Tuileries quadrangle at Paris during the summer of 1878. It was made of strong canvas, and had a capacity of about 25,000 cubic metres. The car held a large number of persons. A steam-engine of 300 horse-power worked the winding apparatus, and the very strong hick rope by which the balloon was moored weighed fully 6000 lb. Mr E. Douglas Archibald's captive kite balloon, described in vol. xxxvi. of *Nature* (1887), has the kite so attached as to admit of the rope being fastened two thirds of the way up the side of the balloon, and thus counteracts the depression of the balloon by the wind.

Controllable Balloons.—Although there were one or two earlier experiments tried in the way of steering balloons (e.g. by Giffard in 1852, and Dupuy de Lôme in 1872), M. Gaston Tissandier is the first aéronaut who has at least partially solved this difficult problem. His controllable electric balloon was made at Paris in 1883, and is shown in fig. 2. It is of a peculiar elongated form, and is inflated with hydrogen gas. In size it is 91 feet long, and 29 feet in diameter through the middle. The envelope is made of thin cloth coated with an impermeable varnish. There are two horizontal shafts, one on each side, fastened with silk belts along the centre. These are made of walnut laths, and are flexible. Over the balloon a netting of ribbons is placed, and the car is connected with this netting by twenty suspension ropes—five of these being attached to each of its four corners. A kind of rigging connects the suspension ropes about 6 feet above the car. To this rigging the guide and anchor ropes are attached, and the rudder of unvarnished silk is also arranged behind.

The screw-propeller, which is 9 feet 3 inches in diameter, and consists of two blades, is driven by electricity, and the electrical apparatus consists

of a bichromate of potassium battery, and a dynamo-electric motor. The commutator is so arranged that a current of 6, 12, 18, or 24 elements may pass, and thus the screw has four velocities. The car with the motor, batteries, screw, anchor, and other fittings, weighs nearly 1200 lb., the ballast usually taken up weighed 850 lb., and the

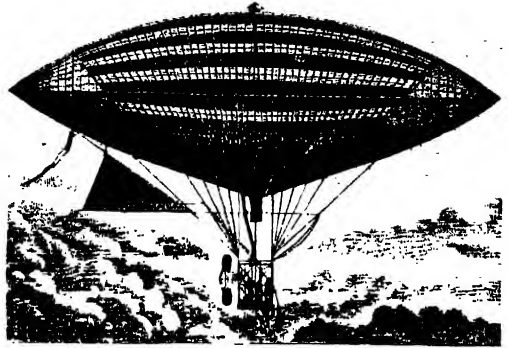


Fig. 2.—Tissandier's Controllable Balloon.

balloon itself weighs 600 lb. In one trial, with the screw making 180 revolutions per minute, Tissandier was able to keep head to a wind moving at the rate of 10 feet per second, and when proceeding with the current, to deviate from the line of wind with great ease. At another time, it is said, he was able to attain a speed—no doubt an independent speed—of 9 miles an hour.

Since Tissandier's voyages were made, the French military authorities have commissioned two of their engineer officers, MM. Renard and Krebs, to construct a balloon somewhat resembling Tissandier's, but with some modifications. It is more elongated, and the car is nearly as long as the balloon. With this air-ship, an independent velocity through the air of 13 miles an hour was on one occasion attained. In most of its voyages the balloon has apparently been steered and guided without difficulty, and at all events, in five out of seven ascents made between August 1884 and September 1885, the aéronauts were able to return to their points of departure.

Several very experienced aéronauts, such as Glaisher, Coxwell, and Nadar, have given their opinion that balloons cannot be steered to any practical extent. On the other hand, some engineers of note take by no means a hopeless view of the question—as Dr W. Pole, F.R.S., and Sir F. Bramwell.

In the United States, ærostation has been prosecuted with great zeal. Mr J. Wise has more than once exploded his balloon, when high up in the air, to show what he considers to be always the case, that the fragments with the network form in such circumstances a parachute, which moderates the rapidity of descent. During 1859 a remarkable flight was made by Mr J. Wise, Mr La Mountain, and others, who, starting from St Louis with the intention of reaching New York, travelled 1150 miles in less than 20 hours. M. Nadar made an important ascent in 1863, and M. Godard in 1864. In 1873 a balloon of 400,000 feet of cubic capacity was made to enable Mr Wise to cross the Atlantic; but the balloon burst. The United States signal service has initiated a series of ascents in the interests of meteorology, Mr S. A. King being the aéronaut engaged. In 1886 Mr Carl Meyers made at Franklin, Pennsylvania, the first ascent known with natural gas. The balloon rose one mile.

It is worthy of remark that though several melancholy cases of loss of life are on record, the number of casualties in the navigation of the air has been less in proportion than in the navigation of the sea. For 1500 aeronauts and 10,000 ascents, calculating approximately, only 15 lives have been lost, certainly a small proportion considering dangers and inexperience.

See Hutton Turner's *Astra Castra: Experiments and Adventures in the Atmosphere* (1865); *Voyages Aériens* (Eng. ed. by T. Glaisher, 1871); *Les Ballons dirigeables*, by Tissandier (1872); *Quart. Rev.*, July 1875; *My Life and Balloon Experiences*, by Coxwell (1888); and the Reports or Proceedings of the Aeronautical Society of Great Britain (founded 1866), the Balloon Society of Great Britain (1880), the French Académie d'Aérostation (1872), and the German Aeronautical Society (1881).

Ballot (from Fr. *ballotte*, 'a little ball') is a little ball used in the practice of secret voting, which is thence generally called 'voting by ballot,' whether it be a ball or a ticket that is used. Votes may be taken by ballot in various ways—e.g. the voter may deposit a ball in either of two boxes, so conjoined that no one shall be able to say into which he drops it; or he may be presented with two balls, a white and a black—and so drop one of them into a box that it shall be unknown which he used. Voting by ballot is now the general method at the elections in countries where constitutional government prevails, and it is usually done by means of papers or cards. Voting by ballot, however, is a very old institution, and was the common form in the historic times both of ancient Greece and Rome. At Athens the voting in the popular assemblies and courts of law was either by show of hands or by ballot. From the use of marked potsherds (Gr. *ostrakon*) in popular voting came the Greek *ostracism*, or secret vote of the people, by which they drove into exile those who became obnoxious to them. *Tabellæ* or tickets were chiefly used by the Romans. If the vote concerned a change in the law, the tickets were marked V. R., the initial letters of the words *Uti Rogas*, expressing consent to the proposer's proposition; and A. for *Antiquo*, 'I am for the old law.' If the vote concerned the election of candidates to a public office, then the tickets bore the names of the candidates. The system of secret voting in Rome was fixed by various laws, the first of which was the *Lex Gabinia*, in 139 B.C.; but the popular assemblies voted by ballot as well as by acclamation long before the passing of these laws.

The system of vote by ballot is much in use among moderns in private or social clubs, and in the election of officers and other acts of public or joint-stock companies. The propriety of employing it in private clubs has never been questioned, for to the harmony of these it is essential that the votes of a few should suffice to exclude an obnoxious person; and in view of the personal and invidious nature of the vote, it is equally essential to their harmony that the voting should be secret. A candidate for admission, who succeeds in the face of a few though not a sufficient number of voters, could not but regard those who voted against him as enemies. But if the voting be by ballot, all he can know, if the voters keep their own counsel, is that some persons were unfriendly. It is thus left open for him to associate on friendly terms with all the members—a condition of the success and continuance of such associations. But whether the system is suited to political and municipal voting has been a question of keen discussion.

We have said that the system prevailed in ancient Greece, and regarding its results—especi-

ally in the exercise of the ostracism—there have been various opinions. While some have considered that the Athenians, for instance, under cover of secrecy often acted without a just sense of responsibility, there is the authority of Mr Grote, in his *History of Greece*, on the other side, to the effect, that they exercised the right most beneficially. But if we have in Mr Grote an advocate of the ballot, in Gibbon we have an opponent of it. In his *Decline and Fall of the Roman Empire*, that historian dates the decline of the republic from the introduction of secret voting, which, he says, destroyed public confidence in effect, broke up the ancient relations of patron and client, and caused a general demoralisation of the people. To come to modern times, we find the ballot in use in the Venetian senate; and that in Britain it was first demanded, not for the purpose of elections, but of votes in parliament. After the restoration in 1662 it was used for purposes of ostracism in the Scottish parliament. In 1710 a proposal for secret voting was carried in the English House of Commons, but rejected by the Lords. From 1840 to 1845 the ballot was in use in the French Chamber of Deputies. But the idea of secret voting in deliberative and legislative assemblies responsible to the people is now universally abandoned as inconsistent with the fundamental principles of popular government, of which publicity and the free criticism rendered possible by publicity are the great safeguards.

Towards the end of the 18th century vote by ballot for elections to parliament was advocated by some of the Whigs; and it was one of the first things demanded by English reformers at the beginning of the 19th century, the followers of Bentham being specially earnest in advocating it. It stood in the original draft of the Reform Bill of 1832. Grote first proposed it in 1833, and renewed the motion every year till 1839. It was one of the six points of the Chartists. In 1851 the proposal of vote by ballot was carried in the Commons against the opposition of Lord J. Russell and the Liberal government of that time by a majority of 51. The report of a select committee of the House of Commons in 1869 greatly contributed to decide public opinion in favour of the ballot as a necessary safeguard against corruption, intimidation, disorder, and all sorts of undue influence at elections. The result was Mr Forster's Ballot Act of 1872, which introduced secret voting at all parliamentary and municipal elections except parliamentary elections for universities. It had already been adopted for school-board elections in 1870. With the introduction of the ballot at parliamentary elections, the public nomination at the hustings, which had been so often associated with rioting and violence, disappeared.

In the New England colonies the practice of secret voting was in vogue from the very first, and it has now been adopted throughout the United States. It is prevalent also in the self-governing English colonies in Canada and Australia, and in most, if not all the countries of Europe which have adopted parliamentary institutions in France, Germany, Italy, &c. While it may with substantial justice be maintained that open voting is theoretically the best at elections of every kind, on the ground that the suffrage being a public trust, it should be openly and manfully exercised with the full sense of responsibility, secret voting is now generally regarded as practically the most satisfactory method. Though it is not a perfect safeguard against bribery and intimidation, it has proved to be very effective. Since its adoption, elections have proceeded with greater quietness, order, and with comparatively little corruption.

Ballo'ta. See HOREHOUND.

Balls, HOLLOW. See SHOT.

Ballycastle, a small seaport in the north of County Antrim, Ireland, on an open bay opposite Rathlin Isle, 68 miles N. of Belfast by rail. Its harbour and pier cost £150,000, but the former is now filled with sand, and the sea has destroyed the latter. Coal was dug here at least 500 years ago. *Bally* represents in place names the Irish *baile*, 'town.' Pop. 1446.

Ballymena, a small town of County Antrim, Ireland, on the Braid, 33 miles NNW. of Belfast by rail. It lies in a densely peopled and well-cultivated district, the inhabitants uniting the pursuit of agriculture with the manufacture of linen. Ballymena is one of the greatest linen and flax markets in Ireland, and its vicinity is covered with extensive bleach-fields. Pop. (1881) 8883.

Ballymoney, a market-town of County Antrim, Ireland, 53 miles NNW. of Belfast by rail. It has some trade in linen. Pop. (1881) 3049.

Ballyshannon, a small seaport town of County Donegal, Ireland, the chief town of the county, though not the capital. It is situated at the mouth of the river Erne, on a small inlet running off from Donegal Bay, 157 miles NW. of Dublin by rail. There is a salmon-leap and a valuable salmon-fishery on the river. Pop. (1881) 2840.

Balm (*Melissa officinalis*), a fragrant perennial herb belonging to the order Labiate, a native of the south of Europe and Western Asia, and naturalised in a few places in England, has long been cultivated in gardens. The stems and leaves are still occasionally used in medicine as a gentle stimulant and tonic, and were formerly in high repute. The taste is somewhat austere, and slightly aromatic. The quantity of essential oil, on which its whole qualities depend, is not more than sufficient to communicate a pleasant flavour to the infusion. — A variety of the common Cat mint (*Nepeta cataria*), with a smell like that of balm, is often mistaken for it. Moldavian Balm (*Draccephalum moldavicum*) is a native of Eastern Europe, Siberia, &c. Bastard Balm (*Melittis melissophyllum*), a native of the south of England and of many parts of Europe, is a



Common Balm
(*Melissa officinalis*).

very beautiful plant, which when dried has a delightful fragrance, and retains it long. *Calamintha nepeta* is sometimes called Field-balm, while *Collinsonia* is termed Horse-balm in America. Balm-like properties are extremely common among the Labiate (q.v.). The name is from the late Latin *balsamum*.

Baline, Col de, a mountain pass between Mont Blanc and the Dent du Midi, over which goes the route from Martigny to Chamonix. The summit is 7200 feet high.

Balmerino, a small village of Fife, on the Firth of Tay, 3½ miles SW. of Dundee by water. Near it are scanty remains of a Cistercian abbey (1227), whose lands came into the possession of Sir James Elphinstone, created Lord Balmerino in 1604. The sixth and last lord (1688–1746) was beheaded on Tower Hill for his share in the '45. See J. Campbell's *History of Balmerino* (Edin. 1867).

Balm of Gilead. See BALSAM OF GILEAD.

Balmo'ral, a royal residence in Braemar, Aberdeenshire, 9 miles W. of Ballater, and 52½ of Aberdeen. Standing 926 feet above sea-level on a natural platform that slopes gently down from the base of Craig-gowan (1437 feet) to the margin of the river Dee, it commands a magnificent prospect on every side. In 1848 Prince Albert purchased the reversion of a 38 years' lease from the representatives of Sir Robert Gordon, who had held it under the Earl of Fife; and in 1852 he acquired the fee-simple of the estate from the Fife trustees for a sum of £32,000. The old castle not being sufficiently commodious for the royal family, Prince Albert erected a new one (1853–55) at a cost of £100,000 in the Scottish Baronial style of architecture. The castle consists of two separate blocks of building, united by wings, with a massive tower 35 feet square, rising to the height of 80 feet, and surmounted by a turret 20 feet higher. At a distance, the castle, which is built of granite, has a strong and imposing appearance, looking almost as if it had been hewn out of one huge rock of that material. The estate now includes Birkhall, Knock Castle ruins, and Loch Muick; and extending to the summit of Byron's 'dark Lochnagar,' it, with its deer forest, comprises upwards of 25,000 acres.

Balnaves, HENRY, of Halhill, Scottish Reformer, was born at Kirkcaldy in Fife of poor parents, but was educated at St Andrews University and at Cologne. He acted for some time as a procurator at St Andrews; in 1538 James V. made him a Lord of Session; and in 1543 the regent Arran appointed him secretary of state. Shortly after, however, he suffered a six-months' imprisonment in Blackness Castle on account of his Protestantism; and next year, like Knox, he joined Beaton's murderers in the castle of St Andrews. When the castle was captured by the French (1547), Balnaves, with Knox and others, was sent to Rouen as a prisoner of war. While in prison here, he wrote a treatise on Justification, which, with notes and a preface by Knox, was published in 1584 as *The Confession of Faith*. In 1536 Balnaves' forfeiture was rescinded, and he returned to Scotland, and took an active part on the side of the Lords of the Congregation. In 1563 he was nominated a commissioner to revise *The Book of Discipline*. He died in 1579.

Balrampur, a town of Oudh, India, near the frontier of Nepal. Pop. 15,000.

Balsam, a name formerly comprehending medicines compounded of resins and oils, as well as many resinous substances and oils, to which important medicinal virtues were ascribed. When the term balsam is now used without addition, the balsams of Peru and Tolu are generally intended. — These two balsams are very similar in all their more important properties, and are both produced by trees of the genus *Myroxylon*, of the natural order Leguminosæ, sub-order Papilionaceæ, natives of the tropical parts of America. *M. pereiræ*, the source of balsam of Peru, is a tree found in the state of San Salvador, in the district called Balsam Coast.

M. toluifera, a native of Venezuela, Ecuador, and Brazil, furnishes balsam of Tolu. After being bruised and charred, the bark of the former falls off, and balsam begins to exude. It is received on rags, which, when saturated, are boiled in water, the separated balsam falling to the bottom. It is a liquid, having the appearance of treacle, but rather less viscid. Balsam of Tolu is generally soft and tenacious when first imported, becoming hard by age. Both balsams have a very fragrant odour. They are used in confectionery, to impart a flavour like that of vanilla; also in perfumery, and for pastilles, &c. In medicine, they are administered as gentle stimulants and tonics, and particularly in chronic bronchial affections. *Tolu lozenges* are a popular and pleasant remedy for troublesome coughs. These balsams are also used for cleansing ulcers.—They contain cinnamic acid, and a peculiar oily substance which has been called *cinnamine*, and is also known as Oil of Balsam of Peru. The name *White Balsam of Peru* is sometimes given to a balsamic substance which flows from the *Liquidambar styraciflua*. See LIQUIDAMBAR.

Balsam is also the common name of a genus of succulent herbaceous plants, of which the beautiful balsam (*Impatiens balsamina*), so much cultivated in gardens and greenhouses, is a familiar example.

Upwards of one hundred species are known, natives chiefly of damp bushy places in the East Indies, and many of them plants of great beauty. They are almost all annuals, and have generally white or red flowers. The balsams are usually regarded as a sub-order of Geraniaceæ (see GERANIUM), of which they are simply the most differentiated type, but are distinguished by the extreme irregularity of the



Balsam (*Impatiens trocarnis*).

flowers, which have been the subject of much controversy among morphologists, and also by the beakless fruit, which is a five-celled capsule, bursting by five elastic valves. The leaves are simple, and without stipules, the flowers generally axillary. The common balsam is a native of the East Indies and Japan. Many fine varieties, double as well as single, and of all varieties of colour and marking, have resulted from careful cultivation, and florists distinguish pyramidal, dwarf, and camellia-flowered races. It has an upright succulent stem, usually about 1-2 feet high, but in favourable circumstances will attain a greater size. In Britain, the seed is usually sown on a slight hotbed, and the plant is often kept in the greenhouse; although even in Scotland it may be made an ornament of a sheltered border. It is one of the flowers frequently to be seen in cottage-windows. A vulnerary was formerly prepared from it, whence it has its name. One species of balsam (*Impatiens noli-me-tangere*), called Yellow Balsam or Touch-me-not, is a native of Europe, and a doubtful native of Britain. It has yellow flowers,

and one of the petals prolonged into a spur. Its ripe capsules burst on the slightest touch, scattering the seed.

Balsam or **Balm of Gilead** is a liquid resinous substance, which has long enjoyed a very high reputation in the East for its fragrance and medicinal virtues. It is the subject of several allusions in the Old Testament, and is celebrated by Strabo, Pliny, Diodorus Siculus, and other ancient writers, almost as a cure for every disease. It is generally believed to be derived from a species of *Balsamodendron* (q.v.). The finest balsam, called *Opobalsam*, or *Balm of Mecca*, is of a golden yellow colour, and of a consistence like honey. Balm of Gilead is irritating when applied to the skin. Other substances sometimes designated balsams, and possessing a somewhat similar fragrance, are produced by different species of *Myricaceæ* (q.v.). Among them is one called *American Balm of Gilead*, the produce of a tree called *Leica Carana*.—Balsamic substances are furnished also by a number of species of *Clusiaceæ*.—Balsam of Umiri, a fragrant yellow fluid, by *Humirum floribundum*, a South American tree, of the natural order *Humiraceæ*.—Canada Balsam (q.v.) is a kind of turpentine obtained from the Balm of Gilead Fir (*Abies balsamea*); Hungarian Balsam, from the Mugho or Mountain Pine (*Pinus pumilio* or *Mughus*); and Carpathian Balsam, from the Stone Pine (*Pinus pinca*). See FIR and PINE. —Balsam of Copaiva (q.v.) is the produce of different species of *Copaifera*. See EMBALMING.

Balsamodendron (Gr., 'balsam-tree'), a genus of small trees or bushes of the natural order *Terebinthaceæ* (q.v.). Some of them are spiny; they generally exhibit a scrubby appearance, and have little foliage, but are remarkable for the resins or balsams obtained from their wood and fruit—as Balsam of Gilead, Myrrh, Bdellium, and Elemi (q.v.). The known species are mostly natives of the East Indies, Arabia, and the east of Africa.

Balta, a town on the Kodema, an affluent of the Bug, in the government of Podolia, Russian Poland. Tallow-melting, soap-boiling, and brewing are carried on. Pop. (1880) 22,440.

Baltic, BATTLE OF THE. See COPENHAGEN.

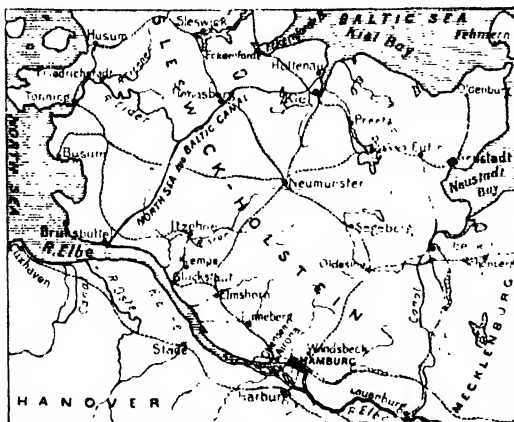
Baltic Provinces (in Russia). This term, in a wider sense, comprehends the five Russian governments bordering on the Baltic—viz. Courland, Livonia, Esthonia, Petersburg, and Finland; in a restricted sense it often designates the first three. The Baltic provinces once belonged to Sweden, except Courland, which was a dependency of Poland. They came into the possession of Russia partly in the beginning of the 18th century, through the conquests of Peter the Great, partly under Alexander in 1809. The three Baltic governments strictly so called have an area of 36,500 sq. m., and (1882) a population of 2,196,396. No pains have been spared to Russianise them, and since 1876-77 they have lost their remaining privileges, and been thoroughly incorporated in the Russian empire. They form, however, a borderland between the Germanic and Slavonic areas, and have been a frequent cause of difficulty between Germany and Russia. The bulk of the population (over 1½ millions) is composed of Esths and Letts; the Germans number above 200,000, the Russians only 65,000. See also LITHUANIA.

Baltic Sea is the great gulf or inland sea bordered by Denmark, Germany, Russia, and Sweden, and communicating with the Kattegat and North Sea by the Sound and the Great and Little Belts. Its length is from 850 to 900 miles; breadth, from 100 to 200; and area, including the Gulfs of Bothnia and Finland, 184,496 sq. m., of which

12,753 are occupied by islands. Its mean depth is 44 fathoms, and the greatest ascertained depth, between Gotland and Courland, 140. Its shallowness and narrowness, its numerous islands and reefs, the shoal coasts of Prussia on the one side, and the rocky coasts of Sweden on the other, and above all, the numerous and sudden changes of wind accompanied by violent storms, make the navigation of the Baltic very dangerous. The group of the Åland Islands divides the south part of the sea from the north part or Gulf of Bothnia (q.v.). The Gulf of Finland (q.v.), branching off eastwards into Russia, separates Finland from Esthonia. A third Gulf is that of Riga or Livonia. The Kurisch and other Haffs (q.v.) are not gulfs, but fresh-water lakes at the mouths of rivers.

The water of the Baltic is colder and clearer than that of the ocean, and contains only a fourth of the proportion of salt found in the Atlantic. Ice hinders the navigation of the Baltic from three to five months yearly. Rarely, as in 1658 and 1809, the whole surface is frozen over. Tides, as in all inland seas, are little perceptible—at Copenhagen, about a foot; yet the water rises and falls at times, though from other causes, chiefly from the varying quantity of water in the rivers at different seasons. Upwards of 250 rivers flow into this sea, which, through them and its lakes, drains rather less than one-fifth of all Europe, its drainage area being estimated by Dr W. B. Carpenter as 717,000 sq. m. The chief of these rivers are the Oder, Vistula, Niemen, Dwina, Narva, Neva; the waters of Lake Maaler, and those of Wetter and other lakes reach the sea through the river Motala. The principal islands are Zealand, Fünen, Bornholm, Samöe, and Laaland, belonging to Denmark; the Swedish islands Gotland, Öland, and Hveen (in the Sound); the Åland Islands, belonging to Russia; and Rügen, to Prussia. Timber, hides, tallow, and grain are the chief exports from the countries bordering on the Baltic. The number of vessels that pass the Sound to or from the Baltic annually is very large. See SOUND.

The Eider Canal, connecting the Baltic near Kiel with the North Sea at Tonnungen, facilitates the grain trade in mild winters, and the two seas are also connected by the Gotha Canal, which joins the lakes of South Sweden. These are navigable for boats of light draught only; but



Map showing the new Baltic and North Sea Canal.

in June 1887, works were inaugurated for a great canal, from Brunshüttel, at the mouth of the Elbe, to Holtzenau and Kiel, which will allow the passage of the largest vessels. It will be 61 miles long, 26 feet deep, 65 yards wide at the surface, and

24 at the bottom; and as the voyage round from the Elbe to Kiel represents nearly 600 miles of dangerous sailing or steaming, the possession of such a waterway will be of great value to the German navy. The cost is estimated at about £8,000,000, and the yearly maintenance at £50,000. The most important harbours in the Baltic are: in Denmark, Copenhagen; in Germany, Kiel, Lübeck, Stralsund, Stettin, Danzig, Königsberg, and Memel; in Russia, Riga, Narva, Kronstadt, and Sveaborg; and in Sweden, Stockholm and Karlskrona. The shores of the Baltic in Prussia and Courland have been long noted for the amber cast ashore by the waves in stormy weather. Another important phenomenon connected with the Baltic is a slow vertical movement of its coasts, downwards in the south of Sweden, but farther north upwards, being there supposed to be at the rate of 3 feet in a century. Its area is held to be gradually decreasing. The Germanic nations call this sea *Ostsee*, or East Sea; the name Baltic first appears in the 11th century, in a work by Adam of Bremen.

Baltimore, a port of entry and the largest city of Maryland, and the seventh city of the United States in population, stands on the northern bank of the river Patapsco, an arm of Chesapeake Bay, about 250 miles by ship-channel from the ocean, 96 miles S.W. of Philadelphia, and 40 N.E. of Washington, D.C., in 39° 17' N. lat., 76° 37' W. long. Its site is uneven, and its surroundings are picturesque and pleasant. The plan of the streets is not so strictly uniform as in many American cities. The harbour is spacious and perfectly secure, having a minimum depth of 24 feet, and access from the sea is safe and easy. Baltimore is reached by numerous lines of railway connecting in a Grand Union Depot, and having several other stations in various parts of the city. It is an important centre of the traffic in bread-stuffs, which are largely received by rail and shipped at this point. Other leading articles of export are tobacco, provisions, coal, cotton, naval stores, canned fruits, and oysters. The imports include large amounts of guano, coffee and other tropical products, fertilisers, iron, steel, tin-plate, and chemicals. Baltimore is also the seat of extensive and varied manufactures, and in 1880 it ranked as the eighth city of the United States in the extent of its manufacturing interests. Its manufactured products include cotton and woollen goods; flour of superior quality, largely produced in Baltimore and vicinity; tobacco and cigars, in the manufacture of which is employed a capital of more than a million dollars; beer; glassware; boots and shoes; iron and steel, including machinery, car-wheels, iron bridges, stoves, furnaces, &c.; clothing, in the manufacture of which nearly \$4,000,000 are invested, producing goods to the value of about \$10,000,000 per annum; pianos, organs, &c. One of the principal industries of Baltimore is the canning of oysters, in which over 6500 hands are employed during the annual oyster season—several thousand vessels being engaged in the oyster fishery, and bringing to this port from 8,000,000 to 12,000,000 bushels of oysters. It is estimated that the various departments of the oyster industry of Baltimore give employment to over 20,000 hands, whose wages aggregate about \$3,500,000 each year.

Baltimore is noted for the fine architecture of its public and other buildings, among the finest being the chamber of commerce, the Roman Catholic cathedral, the custom-house, the Maryland Institute, the academy of music, the city-hall, the Johns Hopkins Hospital, the post-office, and the Peabody Institute (see PEABODY). The public

monuments, of which five or more are noteworthy (the Washington column being 210 feet high), have given Baltimore the name of the 'monumental city.' There are several public squares and parks, the beautiful Druid Hill Park of nearly 700 acres, purchased by the city at a cost of about \$800,000, being the most celebrated. There are some 200 churches, among which the Roman Catholic, the Protestant Episcopal, and the Methodist denominations are conspicuous. The educational institutions are many and important. The Johns Hopkins University, endowed with over \$3,500,000 by a Quaker philanthropist of that name (1795-1873), was opened in 1876, and already takes rank as one of the first seats of learning in the country. Among other institutions are the Baltimore City College, the Baltimore Female College (Methodist), the academy of science, the law school, three or more medical schools, Loyola College, St Mary's University, and a state normal school; and there are complete systems of graded public and parochial schools. The city has a number of good libraries, of which the largest is that of the Peabody Institute (1876).

Baltimore is a place of much wealth and social refinement, and is noted as an art-centre. It is the seat of a Roman Catholic archbishop, who has the rank of primate of the United States, the see being the oldest in the country. The diocese of Baltimore was created in 1789; and the see became archiepiscopal in 1808. Dr John Carroll was the first bishop and archbishop. Owing to the fact that Maryland was originally settled to a great extent by members of the Roman Catholic Church (chiefly of English birth), that church and its adherents have always had a greater social influence in Baltimore than in most American cities of its size. Baltimore is also the seat of a bishop of the Protestant Episcopal Church. The population of the city is of various origin. Less than one-sixth of the people in 1880 were of African descent, and about one-sixth were of foreign birth. Among the native born population of the city there is a rather large element of German descent, and many Irish and French creole families were among the earlier settlers. In colonial days, the English Puritans, and later, the Scotch-Irish Presbyterians, were here numerous. Of the present inhabitants, a considerable proportion have been born in states lying farther north than Maryland.

Founded in 1729, the city was named in honour of Lord Baltimore, the founder of the Maryland colony, and in 1796 was incorporated as a city. It very early became noted for its commerce and ship-building. It was the scene of important events during the war of 1812-15, and in the early part of the civil war of 1861-65. Pop. (1790) 13,503; (1830) 80,625; (1860) 212,218; (1880) 332,313; (1890) 434,439. Several large and populous suburban towns are not represented in these official census figures.

Baltimore is a small fishing-village in County Cork, on Baltimore Bay 7 miles SW. of Skibbereen. Here was established in 1887, by the Baroness Burdett-Coutts, a technical school for giving instruction in all that pertains to fishing, sail-making, net-making, &c.

Baltimore. GEORGE CALVERT, first LORD, born at Kipling, in Yorkshire, about 1580, entered parliament in 1609, was knighted in 1617, and in 1619 became Secretary of State. In 1625 he declared himself a Catholic, and resigning his office, received the rank of Baron Baltimore in the Irish peerage. His Irish estates were at the same time confirmed to him, and thither he retired. As early as 1621, Calvert had despatched colonists to a

small settlement in Newfoundland, and in 1627 he visited the place. In the following spring he returned with his family, and stayed till the autumn of 1629. The severe winter induced him to sail southward in search of a more genial country; but his attempts to settle in Virginia led to disputes, and he returned home to obtain a fresh charter. He died, April 15, 1632, before the completion of the patent, which was granted in June to his son, Cecil, second Lord Baltimore. See MARYLAND, and Life by Neill (Balt. 1869).

Baltimore Bird or Oriole (*Icterus Baltimori*), a finch-like perching bird, very common in North America from Canada to Mexico. The males arrive from the south about the beginning of May, and are soon followed by the females. They settle near houses on tulip-trees, pea-vines, and the like, and build a beautiful hanging nest of skillfully interwoven moss and fibres. The name 'hang nest' obviously refers to this habit. They levy contributions from any loose soft material that may come handy, such as the hairs of horses and cattle, the thread laid out for bleaching, or the strings wound round the fruit-tree grafts. The



Baltimore Oriole.

pendulous pouch measures 6 or 7 inches in length, and varies somewhat according to the climate. The bird itself is somewhat smaller than a starling, measuring about 7 inches in length, with sharp conical bill longer than the head, long pointed wings, and medium-sized rounded tail. The plumage is very gay, especially in the males, glossy black, finely contrasting with bright orange and vermillion. Orange and black were the colours of Lord Baltimore's livery, hence the name Baltimore Bird. Another of its many aliases, 'fire-bird,' describes its bright flashing appearance among the branches. The song is powerful and pleasing, and is peculiarly mellow during the love-season. These birds are gregarious, and while they do some damage by plundering pea-pods and other fruits, more than compensate for their thefts by their destruction of orchard insects like the cankerworm and tent-caterpillars. They are quick and lively in their habits, and make courageous parents. The genus *Icterus* must be distinguished from the true Orioles (q.v.). See Baird, Brewer, and Ridgway, *North-American Birds*.

Baltistan, or LITTLE TIBET, is an alpine region through which the Upper Indus flows. It lies below the Kara-Korum Mountains and the Himalayas, with a mean elevation of 11,000 feet, and contains the nameless peak marked K², 28,278 feet high, next to Everest, the highest on the globe.

It is politically a part of Kashmir, and the inhabitants are of Mongolian stock.

Baltjik, a seaport of Bulgaria, on the shore of the Black Sea, 20 miles N.E. of Varna. Near it are the ruins of Tomi, whither Ovid was exiled. Pop. 4000.

Baluchistan. See BELUCHISTAN.

Balzac, HONORÉ DE, was born at Tours on the 20th May 1799. He was educated at the Collège de Vendôme and studied law at the Sorbonne. In opposition to his father's wish that he should become a notary, he left Tours, in 1819 to seek his fortune as an author in Paris. From 1819 to 1830 he led a life of frequent privation and incessant industry, producing stories which neither found nor de- vved to find readers, and incurring mainly through unlucky business speculations a heavy burden of debt, which harassed him to the end of his career. He first tasted success in his thirtieth year on the publication of *Les Derniers Chouans*, which was soon afterwards followed by *La Peau de Chagrin*, a marvellous interweaving of the supernatural into modern life, and the earliest of his great works. After writing several other novels, he formed the design of presenting in the *Comédie Humaine* a complete picture of modern civilisation. All ranks, professions, arts, trades, all phases of manners in town and country, were to be represented in his imaginary system of things. In attempting to carry out this impossible design, he produced what is almost in itself a literature. The stories composing the *Comédie Humaine* are classified as 'Scenes de la Vie Privée, de la Vie Parisienne, de la Vie Politique, de la Vie Militaire,' &c. They are connected by a web of intrigue which has the Paris of the Restoration for its centre, but which stretches its threads over the provinces. Each of the actors in the brilliant crowded drama is minutely described and clothed with individuality, while the scenes in which they move are set forth with a picturesqueness and verisimilitude hardly to be matched in fiction. Among the masterpieces which form part of Balzac's vast scheme may be mentioned *La Recherche de l'Abololu*, *Le Père Goriot*, *Les Illusions Perdues*, *Les Paysans*, *Les Marais*, *La Femme de trente Ans*, *Les Père des Poivres*, and *Eugénie Grandet*. The *Contes Probatiques* (1833) stand by themselves. They are a series of gross stories in the vein of Rabelais, Balzac reproducing with masterly skill the French of the 16th century. Balzac's industry was phenomenal. He represents himself as working regularly for fifteen and even eighteen hours a day. He wrote eighty-five novels in twenty years, and he was not a ready writer, being very fastidious in regard to style, and often expending more labour on his proof-sheets than he had given to his manuscript. His work did not bring him wealth; his yearly income, even when he was at the height of his fame, is said to have rarely exceeded 12,000 francs. During his later years he lived principally in his villa, Les Jardies, at Sèvres. In 1849, when his health had broken down, he travelled to Poland to visit Madame Hanska, a rich Polish lady, with whom he had corresponded for more than fifteen years. In 1850 she became his wife, and three months after the marriage, in August of the same year, Balzac died at Paris. His influence on literature has been deep and many-sided, and novelists with so little in common as Feuillet an' Zola can claim him for their master. He studied character and the machinery of society in a scientific spirit, but he was not content with the photographic reproduction of fact. He was a visionary as well as an analyst, an idealist and a realist in one. The materials acquired by study were shaped and coloured by his

fiery and teeming imagination. In the *Comédie Humaine* we see the everyday world reflected in a magic mirror, where the lights are brighter, the shadows darker; where objects stand out in sharper relief, and are sometimes oddly distorted. He strenuously exaggerates in the delineation of character. 'Every one in Balzac,' says Baudelaire, 'down to the very scullions, has genius.' His work bears trace of the strain with which it was produced; it is often coarse, often extravagant, occasionally dull. But few writers give such an impression of intellectual force, and in the power of investing his creations with apparent reality he stands first among novelists. His sister, Laura Surville, whom he loved with a rare affection, and to whom he opened throughout his life all the hopes and sorrows of his heart, wrote his biography (1858). The 'edition definitive' of his works was published in 25 vols. (1869-75); the last contains his correspondence from 1819 to 1850 (Eng. trans., with memoir, 2 vols. 1879). A supplemental volume is the *Histoire des Œuvres de Honoré de Balzac*, by Lovenjoul (1879).

Balzac. JEAN LOUIS GUEZ DE, born at Angoulême in 1594, in his youth was secretary to Cardinal la Valette at Rome. There he cultivated his taste for elegant composition, and on his return to Paris devoted himself to the refinement of his native language. His efforts in this direction have given him a permanent place in the literature of his country; and though his writings do not possess much intrinsic worth, they heralded the splendid phalanx of genius which adorned the subsequent age of Louis XIV. He was a favourite of Cardinal Richelieu, a member of the French Academy, a councillor of state, and historiographer. His violent literary disputes with Father Goula caused him to leave Paris and retire to his hereditary property of Balzac, where he died on the 18th February 1651. His collected works were edited by the Abbé Cassigne (1665); selections, by Maltourne (1822), and Moreau (1854). Of all his works, his *Lettres* (1806) and *Lettres Inédites* (1874) are most admired.

Bambarra, one of the Soudan states of Western Africa, lying (where 5° W. long. and 12° N. lat. cross one another) on both sides of the Upper Niger. In the east, the country is flat and swampy; but in the west there are low chains of granite hills. The climate in some parts is intensely hot, but is generally healthy. The land is well watered and fertile. The inhabitants, a branch of the Mandingoes (q.v.), number about 2,000,000, and are superior to their neighbours in intelligence. The upper classes profess Mohammedanism, but the lower are pagans. The principal towns are Sego, Sansanding, Yamina, and Bamako. Many local merchants are very wealthy, and a pretty extensive trade is carried on, the natives working articles in gold, ivory, and iron. In 1881 a treaty with the sultan of Sego opened up the country to French traders.

Bamberg, a Bavarian city, in Upper Franconia, beautifully situated on the banks of the Regnitz, 3 miles above its confluence with the Main, and 33 N. of Nuremberg by rail. Set in the midst of vineyards, orchards, and hop-gardens, and founded about 769, from 1007 to 1802 it was the seat of independent prince-bishops. The most noteworthy of its fourteen churches is the cathedral, a magnificent edifice in the Romanesque style, founded by the Emperor Henry II. in 1004, and thoroughly restored in 1828-37. It has five towers, and contains, among other monuments, the elaborately carved tomb of the founder and his empress, Cunigunda. There are several other fine ecclesiastical structures of early

date, and opposite the cathedral is the palace (1702) of the former prince-bishops, from one of whose windows Marshal Berthier (q.v.) met his death. St Michael's Benedictine abbey (1009) was in 1803 converted into an almshouse. The ruins of the castle of Altenburg, originally the seat of the Counts of Babenberg, and the scene of many important historical events, stand on an eminence $1\frac{1}{2}$ miles from the town. The educational institutions of Bamberg are numerous. Pop. (1871) 25,738; (1885) 31,295; chiefly engaged in the manufacture of beer which is famous throughout Germany, cotton, cloth, gloves, tobacco, musical instruments, &c. A large export trade in liquorice and garden-seeds is carried on. Albrecht Pfister, one of the earliest printers, was practising his art at Bamberg in 1461.

Bambino (Ital., 'babe'), a term in art descriptive of the swaddled figure of the infant Saviour. The *Santissimo Bambino*, in the church of the Ara Cœli at Rome, is held in great veneration for its supposed miraculous power of curing the sick. It is carved in wood, painted, and richly decorated with jewels and precious stones.

Bamboo (*Bambusa*), a genus of grasses, of which most of the species attain a great size, many of them 20 or 30 feet, some 70 or 100 feet in height. The species are numerous, and are found in tropical and subtropical regions, both of the eastern and western hemispheres. Some of the species grow to the height of only a few feet; and almost all of them are slender in proportion to their height, although *B. guada* has often a trunk 16 inches in diameter. All of them have a jointed subterranean root-stock (rhizome), which throws



Bambusa falcata :

a, upper portion of the stem, with foliage; b, root-stem; c, section of stem

up 10-100 stems. The *c* are generally straight and erect; although one large species (*B. agnes is*), common in dry mountainous situations in the south-east of Asia, has crooked, and sometimes

creeping stems. The stems grow to their full height unbranched, but afterwards throw out straight horizontal branches, especially in their upper parts, forming a dense thicket; some of the smaller kinds are often planted as hedges. The stems are jointed like those of other grasses, very hard, but light, elastic, and hollow, containing only a light spongy pith, except at the joints or nodes, where they are divided by strong partitions. The stems of different species vary also very much in the thickness of the woody part, and so in their adaptation to different purposes. In China and Japan is found a bamboo the stem of which, instead of being cylindrical like that of other bamboos and all grasses, is square. At three years old, this stem is one inch in section each way (see *Nature*, vol. xxxii.). The *hairy* bamboo is one of the most useful in China. The external covering of the stem is, in all the species, remarkably siliceous; the stem of *B. tabacaria* is so hard that it strikes fire when the hatchet is applied. There is perhaps scarcely any plant that serves such a variety of domestic and economical purposes. It would be difficult to point out an object in which strength and elasticity are required, and for which lightness is no objection, to which the stems of the different species are not applied. In the whole of the East, particularly in India, China, and Japan, in Jamaica and other parts of the West Indies, and some parts of South America, it forms almost the sole material of which the houses of the poor are built. It is employed for water-pipes, for which purpose its hollow stems (after the partitions at the joints are removed) render it eminently well fitted. It is used in the building of bridges, in the manufacture of furniture, ladders, masts for boats, rails, fences, spear-shafts, domestic utensils, and agricultural implements. The stems are also split up finely and worked into mats, and ropes, and even into the sails of boats. From both the external and internal pellicles of the stems an excellent paper is made by bruising and steeping it in water till it becomes a paste. Large quantities of bamboo cane are imported to Europe for various purposes, such as the making of walking-sticks, stakes for flowers and the training of fruit-trees in nurseries, and the manufacture of wicker-work. The leaves of some kinds are used as thatch in the making of hats and mats; those mats seen enfolded chests of tea being made of the leaves of one species cultivated by the Chinese for that purpose. The shoots, when young and tender, are eaten in the same way as asparagus, or boiled with milk, or made into broth with the addition of animal food, spices, and salt; also along with the young root-stocks they are pickled in vinegar wherever they abound in the East, and are imported into Europe as an eastern condiment under the name *Achiar* or *Achar*. The pith of some species is sugary, and at certain seasons a saccharine juice exudes from it at the joints, which becomes concrete on exposure to sun and air, and is used for domestic and economic purposes in India. This substance is called *Indian Honey*, and is erroneously also sometimes named *Tabaris* or *Tabasheer*, a name which properly belongs to another and very remarkable substance produced in the hollow internodes of the stems of some of the species (see *TABASHEER*). The seeds of some species are used as rice, and for making a kind of beer. Bamboos are generally of very rapid growth, and they are often found in arid situations, which would otherwise be destitute of vegetation. *B. guada* and *B. latifolia*, both natives of South America, have the internodes of the stems filled with clear fluid of an agreeable taste, which, though containing slight traces of sulphates and chlorides, can scarcely be distinguished from pure spring-water. It is not improbable that they may yet be

employed, where they do not naturally abound, to render districts productive which are now little else than deserts, in climates like those of Arabia, the north of Africa, and Australia; and the quality of the grain of different species seems to deserve more attention than it has yet received. The species common in the West Indies (*B. vulgaris*) is supposed to have been introduced from the East Indies. A few species are found in the Himalaya, to an altitude of 12,000 feet, and a dwarf species from that region has been successfully tried in the open air in England. See JUNGLE.

Bamborough Castle, an ancient fortress on the coast of Northumberland, 5 miles E. of Belford, and 16½ S.E. of Berwick. It crowns a basaltic rock, 150 feet high, and accessible only on the S.E. side. According to the *Saxon Chronicle*, it was founded about 547 by Ida the 'Flame-bearer,' first king of Northumbria, and named *Bebbanburgh*, after Bebbe, his queen. In 642 it was unsuccessfully besieged by Penda, the heathen king of Mercia; and during the Danish descents on England it twice was partly demolished. Robert de Mowbray, the rebellious Earl of Northumberland, having fallen into the hands of William Rufus in 1095, his countess surrendered the stronghold under the threat of seeing his eyes seared out. When Northumberland was granted to Henry, son of David I. of Scotland, Bamborough Castle was reserved for the English crown, and here Baliol acknowledged Edward I.'s supremacy in 1296. During the Wars of the Roses, it was the scene of several conflicts, and was so battered and destroyed that it has not again been used as a fortress. In the reign of Elizabeth, its governor was Sir John Forster, and it continued in his family till Tom Forster forfeited it for his share in the '15, as is finely told in Mr Besant's romance. Lord Crewe, Bishop of Durham, then bought it, with the Forster estates, and bequeathed it in 1721 to trustees for benevolent purposes. The restoration of the castle, and its conversion to its present charitable uses, were chiefly carried out by the Rev. Dr John Sharpe, who in 1792 left his library to the institution. Its income, which is about £9000, is expended in providing a cheap market for the poor; a dispensary for the sick; funds for maintaining, educating, and starting in life poor children of the district; appliances for the rescue and relief of shipwrecked sailors; the repair of churches; and aiding young men at the universities. Bamborough village, near the castle, was a royal borough before the Conquest, and in the time of Edward I. returned two members to parliament. Grace Darling (q.v.) is buried in the churchyard. See *Freeman's English Towns and Districts* (1883).

Bambouk, a county of Senegambia, Western Africa, lying in the angle formed by the Senegal and Faleme rivers. The climate is unhealthy, especially during the rainy season; but the valleys are remarkable for their fertility. Trees common to Western Africa here attain enormous proportions. Vast herds of wild oxen roam the hills, and most of the wild animals of Africa abound. Bambouk has rich iron ore and deposits of gold in its rivers, especially the Faleme. Faranaba and Mandinka are the chief towns. The inhabitants, the Mandingoes, are professedly Mohammedans, but they cling to many pagan superstitions, and are very ferocious.

Bamian is a mountain-valley in Afghanistan, on the chief road between Kabul and Turkestan, and near the northern base of the Koh-i-baba range (see map at AFGHANISTAN). The valley itself lies 8500 feet above sea-level. The stream that drains it ultimately finds its way to the Oxus. The inhabitants are Hazaras. The most notable feature of

the district is a number of human figures of enormous size carved in the conglomerate rocks, from 200 to 300 feet high, which form the northern side of the valley. Of these there are five in all; and the



The largest of the Figures at Bamian.

two principal were described by the Chinese Buddhist monk, Hwen Thsang, who visited the valley about 630 A.D. By recent careful measurement, it appears that the largest is 173 feet high, or 3 feet higher than the Nelson Monument in Trafalgar Square; the second is 120 feet; the others are about 50 and 30 feet. The figures are solidly carved in niches in the rock, but the drapery and finishing are in stucco; and they have been much damaged by cannon shot, said to be those of the army of Nadir Shah. The two larger figures are usually regarded as male and female; but it is certain that Hwen Thsang was right in regarding them both as figures of Buddha; in the Chinese traveller's time there was a large Buddhist settlement here, with 10 convents and 1000 monks, and Bamian was a 'royal city.' That the figures are the work of Buddhist artists from India seems almost certain from their style of art, as also from the pictures with which the niches in which they stand have been covered. Stairs cut in the rock enable visitors to climb to the head of the figures. About two miles east of Bamian there seems to have existed a stupendous recumbent figure '1000 feet in length,' representing Buddha entering Nirvana (q.v.); as modern travellers do not mention any traces of it, it was probably composed of rubble plastered over, and so has disappeared.

The rocks are further full of caves, the great majority of which are occupied at the present day. These caves have curious domed roofs, and are covered with pictures in the same style of art as the niches containing the statues. The caves are dug out of the rock at various heights. There is now no town of Bamian, but there are a few small villages scattered up and down the valley. See an article in the *Journal of the Royal Asiatic Society* (1886) by Captain Talbot, with notes and sketches by Captain Maitland. From these sketches our illustration is taken.

Bampton Lectures, a series so called after the name of their founder, the Rev. John Bampton, a minor canon of Salisbury, who at his death in 1751 left £120 per annum to the university of Oxford, for the endowment of eight divinity-lecture sermons, to be preached at Great St Mary's every year, and to be published, at the expense of the

estate, within two months of their delivery. The lectures are directed to be upon the following subjects: 'to confirm and establish the Christian faith, and to confute all heretics and schismatics; upon the divine authority of the holy Scriptures—upon the authority of the writings of the primitive Fathers as to the faith and practice of the primitive Church—upon the divinity of our Lord and Saviour Jesus Christ—upon the divinity of the Holy Ghost—upon the articles of the Christian Faith as comprehended in the Apostles' and Nicene Creeds.' Only men who have taken the degree of M.A., either at Oxford or Cambridge, are qualified for election, and the same person shall never be chosen twice. The first course was delivered in 1780, since when, with the exception of the years 1834, 1835, and 1841, there has been an unbroken series of very valuable, but rather learned than popular discourses. None of these have caused such controversy as the lectures delivered by Dr Hampden (q.v.) in 1832, on 'The Scholastic Philosophy considered in its Relation to Christian Theology,' which were attacked on all sides, their author being accused of Rationalism and Socinianism. Other more eminent lecturers have been Heber (1815), Whately (1822), Milman (1827), and Horne (1828). The course delivered by Dean Mansel (q.v.) in 1858, on 'The Limits of Religious Thought,' also gave rise to an interesting, but less bitter discussion. Since then, Canon Liddon's lectures (1866) on 'Our Lord's Divinity'; those by Dr Hatch on 'Early Christian Organisation' (1880); and those by Dr Higg on the 'Christian Platonists of Alexandria' (1886) have been among the most important.

A course of lectures similar to the Bampton was founded about the same time at Cambridge by the Rev. John Hulse. See HULSEAN LECTURES.

Ban, a Persian title meaning 'lord,' 'master,' or 'keeper,' and brought into Europe by the Avars. Formerly, it was bestowed on some of the military chiefs who guarded the eastern boundaries of the Hungarian kingdom, and was therefore synonymous with the German *Markgraf*. The ban, who was appointed by the sovereign, but not for life, and whose appointment had to be ratified by the national diet, had originally very extensive powers. In political, judicial, and military affairs, he was the supreme authority within his *Banat*. The most important banats were those of Dalmatia, Croatia, Slavonia, Bosnia, Machow, and Szörény, afterwards formed into the double banat of Dalmatia and Croatia. In 1849, Croatia, Slavonia, and Dalmatia were transformed into Austrian crownlands, and the ban made wholly independent of Hungary; but in 1868 Croatia and Slavonia were reunited with Hungary. One of the Hungarian ministers superintends the affairs of the 'Kingdoms of Croatia and Slavonia,' while there is a special local administration for internal affairs. The head of this administration is called the Ban.

Ban, a word occurring in most of the modern languages of Europe, and primarily signifying 'to proclaim' or 'publish.' This meaning it retains in *Banns* (q.v.) of marriage. In French military language, *ban* is the part of the population first liable to be called out in case of war; the *arrière-ban* is the reserve. In Germany, the *echt* or *bannum* was a sentence of outlawry pronounced in the middle ages against those who escaped from justice, or refused to submit to trial. We often read of refractory princes, and even cities, being placed under the *ban of the empire*. When a grant of land was made for a religious purpose, or when a charter of liberties was granted, the transaction was proclaimed in public with certain ceremonies, and curses were denounced against any one who should violate the deed. Thus *banning*, or publishing,

came to be associated with cursing; and hence the origin of the popular use of the word. It occurs in this sense in Shakespeare and Milton, and other old writers.

Ban'na, the fruit of *Musa sapientium*, a herbaceous plant of arboreal proportions and palm-like aspect, belonging to the natural order Musaceæ. It is believed to have been originally



Musa paradisiaca :
a, fruit.

of the East Indies, but is now found, along with the plantain, distributed and cultivated by man throughout the tropical and subtropical regions of the globe. The banana and the plantain were formerly regarded as distinct species, the latter being named *M. paradisiaca*, but there is no real specific distinction between the two forms. The varieties are very numerous, and run into each other by almost imperceptible gradations, while on the same bunch have been found growing fruits as diverse in form and other qualities as the distinct types commonly known as banana and plantain. To the large-fruited group is often ascribed the more farinaceous quality usually associated with the plantain, and to the small-fruited group the highly saccharine character of the banana.

This distinction can hardly be maintained as constant. Though really herbs, the bananas assume all the appearance of trees. Their stems, formed merely of the sheathing bases of the stalks of the large palm-like leaves, are soft, spongy, and destitute of woody structure, yet attain, according to the different species, the height of from 5 to 25 feet. In the tropics the stems are annual—that is, they die after perfecting the fruit, and fresh stems are developed from buds in the root-stock, which is perennial. These stems, or rather buds, furnish the common means of propagating and making fresh plantations, and the growth is so rapid that the fruit is usually ripe within ten months of the time of planting the offsets. When full grown, the stem is surmounted by a crown of large leaves, 6 to 10 feet long by 2 to 3 feet broad, the blade resembling the blade of an oar, with a strong fleshy foot-stalk and mid-rib. The flowers spring in great spikes from the centre of the crown of leaves, and are arranged in whorl-like clusters along the spike; the female flowers occupying the base of the spike, and the male the apex. The fruits are variously formed, some being angular, others cylindrical or even spherical, and vary in length from 4 to 12

inches, and in diameter from 1 to 1½ inches. The average weight of a bunch is about 25 lb., but individual bunches often exceed 40 lb.

It is one of the principal sources of food in tropical countries, taking the place of the cereals of more temperate climates. Its productive powers are prodigious; per imperial acre, it was estimated by Humboldt to produce 44 times more by weight than the potato, and 133 times more than wheat. It is stated that the fresh core of the fruit yields about 40 per cent. of dry meal. The more mealy kinds are never eaten raw except when ripe, but in all its unripe stages it is boiled and eaten as a vegetable. It is roasted also and flavoured with the juice of orange or lemon and sugar, and made into compôtes; dried in ovens or in the sun, with the addition of spices and sugar, it is formed into a paste that will keep in a perfect condition for years. In South America, besides forming an indispensable article of diet in its fresh state, it is also an important article of internal trade in the shape of flour. The sugary or luscious kinds are used also in a variety of ways, and preserved by drying. By fermentation it yields a wholesome wine.

The banana is in many other ways useful to man. The stem yields a juice that is employed as an astringent, and its spongy pith, when pounded and boiled, forms a tolerably nutritious food of a starchy character. In Tonquin the stems are burned, and the ash used in purifying sugar. All parts of the plant abound in fibre which is believed to be well adapted to the manufacture of cordage and paper, but has never been systematically utilised, except in the most limited manner. The inhabitants of Dacca make from it the string of the bow with which they tease cotton, and in some of the islands of the Indian Ocean cloth is made from it. The top of the stem is boiled and eaten as a vegetable, and the leaves are used in packing, and for many domestic purposes.

There are many other species of *Musa*, the most notable of those besides the banana having edible fruit being *M. Cavendishii*, a very dwarf form, largely cultivated in China; the fruit having similar qualities to the typical form of plantain—i.e. farinaceous rather than saccharine. It is not uncommon in hothouses in this country, being easily cultivated. *M. textilis* (Abaca, q.v.) is the plant that yields the valuable fibre known under the name of Manila Hemp, a product of the Philippine and neighbouring islands. The finer qualities of this fibre are worked into delicate fabrics, so extremely fine that many yards may be inclosed in the hollow of the hand. *M. troglodytarum*, remarkable for bearing its clusters of fruit erect (not pendent as in the other edible species), furnishes food to the natives of the Moluccas, where the plant grows wild. *M. Ensete*, a native of Abyssinia, does not yield edible fruit, but the stem, before it becomes hard and fibrous, is an excellent esculent. Bruce says: 'When soft, like a turnip well boiled, if eaten with milk or butter, it is the best of all food, wholesome, nourishing, and easily digested.'

Banas, or BANAS, the name of three rivers of India. (1) A river of Rajputana, rising in the Aravalli Mountains, flows N.E. through Mewar for 120 miles, then S.E., and falls into the Chambal, after a total course of 300 miles. (2) A river which also rises in the Aravalli Mountains, and after a south-westward course of 180 miles, is lost in the Runn of Cutch. (3) A river of Chutia Nagpur, Bengal, has a north-westward course of about 70 miles, and falls into the Son, near Rampur.

Banat, any district or territory under a Ban (q.v.), but specially applied since 1718 to a part of

Hungary which has no separate *ban* or governor. Bounded W. by the Theiss, S. by the Danube, and N. by the Maros, it consists of the three counties of Temesvár, Torontál, and Krassova. Pop. (1880) 1,308,341. It is partly mountainous and partly flat, is swampy and unhealthy in the west; but is eminently fertile and productive, yielding rich crops of wheat and other grain. The mines are valuable. The principal town is Temesvár. It was formed into an Austrian crown-land in 1849, but was incorporated with Hungary in 1860.

Banbridge, a town in County Down, Ireland, on a steep slope on the left bank of the Bann, 76 miles N. of Dublin. It is a thriving seat of the linen manufacture in all its stages, from the preparation of the soil for the flax-seed to the finishing of the finest linen. Miles of bleaching-grounds exist in the vicinity, and numerous factories along the Bann. Pop. (1841) 3324; (1881) 5609.

Banbury, a small town of Oxfordshire, on the Oxford Canal and the Cherwell, 23 miles N. of Oxford, and 78 N.W. of London by rail. Its strong castle, built about 1125, was demolished during the Great Rebellion, when Banbury was noted for Puritanical zeal. In 1469 the Yorkists were defeated in the vicinity. The town is still famous for its cakes and ale, as in Ben Jonson's day; and it manufactures webbing and agricultural implements. Among the buildings are the parish church (1797) and the town-hall (1854). Till 1885 Banbury returned a member to parliament. Pop. (1871) 4122; (1881) 3600.

Banc, legally, is a seat or bench of justice, and in this sense has given rise to the expression of the English courts of common law 'sitting in banc,' or *in banco*—that is, sitting together on the bench of their respective courts. Since the Judicature Act, 1873, two or more judges sitting together are called a Divisional Court.

Banca, an island from 8 to 20 miles broad lying S.E. of Sumatra, from which it is separated by the Strait of Banca. Together with a few contiguous islands it forms the Dutch Residency of Banca, with an area of 4977 sq. m., and a pop. (1883) of 70,877, of whom as many as 20,495 were Chinese. The surface is for the most part level or undulating, but the island is by no means fertile, the banana and the durian being its only fruits. Gold, iron ore, silver, lead, and amber are found, but tin is the chief mineral. The annual output is valued at over £350,000, and most of it finds a market in China and Japan. The once dense forests have been terribly thinned for smelting purposes. The principal imports are rice, salt, and European goods. The capital, Muntok, in the north-west part of the island, has a fort and 3000 inhabitants.

Banco (It.), a commercial term meaning the standard money in which a bank keeps its accounts, as distinguished from the current money of the place. The distinction was more necessary when the currency was depreciated, or when it consisted, as it often did, of clipped, worn, and foreign coins. These the early banks (Venice, Amsterdam, &c.) received at their intrinsic worth, and credited the depositor in their books with this bank-value. The term was chiefly applied to the money in which the Hamburg bank kept its accounts, before the adoption of the new universal coinage of the German empire. It was not represented by any coinage. See also **BANC**.

Bancroft, GEORGE, principally distinguished as the author of the history of his country, but not without note as a diplomatist and statesman, was born in Worcester, Massachusetts, October 3, 1800. At the age of thirteen he entered Harvard

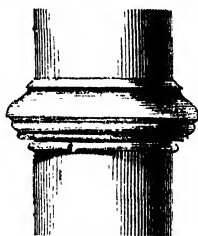
College, graduated with high honours in 1817, and spent two years in study at Göttingen, Germany, where in 1820 he received the degree of Doctor of Philosophy. Returning to America in 1822, he served a year as Greek tutor in Harvard College when he and Dr Cogswell, a fellow-tutor, established the Round Hill School at Northampton, Massachusetts, with which Bancroft was associated until 1830. In 1823 he published a volume of poems, and subsequently made translations from the German of the minor poems of Goethe, Schiller, &c., and of some of the historico-political works of Heeren. In 1834 appeared the first volume of his *History of the United States from the Discovery of the Continent*; followed by the second and third volumes in 1837 and 1840 respectively—the whole embracing *The History of the Colonisation of the United States*. These were succeeded in the interval from 1852 to 1860 by five volumes narrating the history of the colonial period to the Declaration of Independence, and in 1866 and 1874 respectively by the two concluding volumes, bringing the history to the treaty of peace with the mother-country in 1782. Bancroft subsequently published *The History of the Formation of the Constitution of the United States* (2 vols. 1882), which afterwards formed a constituent part of the revised edition of the complete *History of the United States*, embraced in six volumes (1882-84). In his political sentiments, Bancroft in early life was a democrat. He served as collector of the port of Boston (1838-41), under President Van Buren, and was an unsuccessful candidate for the governorship of Massachusetts in 1844. He accepted a seat in the cabinet of President Polk as secretary of the Navy in 1845, and the following year was appointed minister to the court of St James, a position which he filled until 1849, with honour to his country. A period of retirement from public life followed his return to America. In the civil war he was heartily in accord with the national government, and in 1867 he was appointed by President Johnson minister to Berlin, serving with distinguished ability until recalled at his own request in 1874. He afterwards resided in Washington, contributing occasional articles to magazines. He died 17th January 1891.

Bancroft, HUBERT, an industrious North American historian, born in the state of Ohio in 1832, settled at San Francisco in 1852, where he started a bookshop, and soon amassed a large fortune. He formed at a vast expense a library of 40,000 volumes, mainly on old American history and ethnography. A part of the books collected for the library of the Emperor Maximilian of Mexico came into his possession. The result of his profound studies is his well-known work, *The Native Races of the Pacific States* (5 vols. New York, 1875-76), forming the first portion of his colossal undertaking, a *History of the Pacific States of North America*, to be completed in 39 vols. Of this, vol. i. appeared in 1882.

Bancroft, RICHARD, Archbishop of Canterbury, and a bitter opponent of the Puritans, was born at Farnworth, Lancashire, 1514. Sent to Cambridge by his uncle, Hugh Curwen, Archbishop of Dublin, he took his B.A. in 1567, and in 1576 became rector of Teversham, Cambridgeshire. Other preferments followed in rapid succession, until in 1597 he was consecrated Bishop of London. He attended Elizabeth during her last illness; and at the famous Hampton Court Conference under James I., he was one of the chief-commissioners on behalf of the Church of England, and took the lead in the disputations. He succeeded Whitgift as Archbishop of Canterbury in 1604, and died November 2, 1610. Bancroft had a high character as a preacher and statesman, and

was a vigilant ruler of the church. He is author of two treatises and two sermons, one of which, preached at St Paul's in 1588, contains a furious invective against the Puritans.

Band, in Architecture, is the name given to any flat fascia or ornament which is continued horizontally along a wall, or by which a building is encircled. Bands often consist of foliage, quatrefoils, or of simple bricks. *Band of a shaft* is the moulding or suits of mouldings by which the pillars and shafts are encircled in Gothic architecture. Several bands are often placed at equal distances on the body of the shaft, when it is long, in which case they are known as shaft rings.



Band of a Shaft.

Band, or BANDS, linen pendants from the neck, forming part of clerical, legal, and academic costume. It is a moot question whether they are a survival of the Amee (q.v.), or immediate descendants of the wide falling collar which was a part of the ordinary civilian dress in the reign of James I. In the Anglican Church they now are seldom worn, except by ultra-Low Churchmen; but they are in common use with Presbyterian ministers (ordained ministers as distinguished from licentiates). Foreign Catholic ecclesiastics wear black bands with a narrow white border.

Band. *Military Bands* differ from full orchestral bands in being wholly composed of wind-instruments and drums. The musical instruments allowed by government to regiments in the service are confined to trumpets and bugles for the cavalry and artillery, and fifes, bugles, bagpipes, and drums for the infantry and Highland regiments. The usual number attached to infantry regiments is 16 drummers and fifers (or buglers). The 16 are supposed to be able to play either instrument, and are commanded by a sergeant drummer (formerly called drum-major). The Highland regiments have each, in addition, 5 pipers and a sergeant-piper (formerly pipe major), who form a special pipe band. Cavalry regiments have 8 trumpeters and a sergeant-trumpeter (formerly trumpet-major). These several performers, who are paid 1d. per day more than private soldiers, are allowed for the strictly military purpose of signalling commands, &c., in circumstances in which the human voice would be useless. In addition to these there are generally a number of 'acting' pipers, trumpeters, &c., who do not get the extra 1d.

To meet the instrumental and other expenses of a full musical band, the officers above subaltern rank, in addition to a fixed sum on appointment and promotion, each contribute twelve days' pay per annum to a band fund. Government allows the services of 20 men, 1 corporal, 1 sergeant, and a bandmaster, over and above the drummers, &c. already described. Boys are also allowed to the extent of 1 per cent. of the men in the regiment. This brings the number up to about 30. To make the usual number of between 40 and 50 performers, extra men are drawn from the ranks; these are, however, liable to take rank duty on a full inspection parade of the regiment or in active service. In ordinary infantry regiments the pipers and drummers are not usually in the band, as their duties employ them otherwise. In the rifles, however, the buglers, who are more numerous than in other regiments, and in cavalry regiments the trumpeters, all belong to the band, except in such rifle regiments as have their buglers

organised into a separate bugle band. The number of men allowed for the band in cavalry regiments is 15, 1 corporal, 1 sergeant, besides boys, in addition to the trumpeters. Government also contributes £80 per annum to the band fund of each regiment. Cavalry regiments usually possess a double band (composed of the same performers)—namely, a *brass* band for mounted duty, consisting generally of valved brass instruments, treble, tenor, and bass, which can be played with one hand, leaving the other free for the management of the horse; and a *reed* band for dismounted duty or 'programme performance,' in which clarionets, flutes, bassoons, &c. are included. In marching regiments, where the performers have the use of both hands for their instruments, the selection is wider, and the following may be given as a type of a regimental band: 1 piccolo, 1 oboe, 2 E♭ clarionets, 12 B♭ clarionets, 2 bass clarionets, 2 bassoons, 4 horns, 2 baritones, 2 euphoniums, 4 basses, 4 cornets, 2 trumpets, 3 trombones, 2 drums. A great many regiments also have a few performers able to play stringed instruments, usually violoncello and double bass, to assist in the performance of classical music; some regiments even possessing a full string band. Previous to 1857, the bandmasters in the army were almost always private individuals, mostly foreigners, engaged by the officers to instruct the band, and young players were taught by them and the band-sergeant. In that year, however, government instituted a school of military music at Kneller Hall, Twickenham. At first it occupied the same anomalous position as the bands themselves, being partly supported by government and partly by a contribution of £10 per annum from each regiment; but in 1867 the War Office took it over as a government school, and now pays the entire expenses. It has a director of music and nine professors. The primary object of this school is to train promising men, usually band sergeants recommended by their commanding-officer, for the position of bandmasters. They spend about two years in the institution, and are fully instructed in 'counterpoint' in four parts, and in a knowledge of the compass, capabilities, and proper combination of the various military musical instruments. The army is now altogether supplied with bandmasters from this college; about twenty per annum leaving to join different regiments. They belong to the service, are warrant-officers (a rank specially introduced into the army for their benefit), and are paid by government 5s. per day and rations, in addition to £70 per annum from the officers' band fund, with an allowance for house-rent when living out of barracks; the government strictly adhering to the anomaly of the position by thus paying only half the bandmaster's salary. Kneller Hall also trains such young instrumentalists for regimental bands as are recommended by bandmasters from among the most promising of their boys. These band boys either are sons of soldiers in the regiment, or come from the Duke of York's School, the Hibernian School, Dublin, the bands of industrial schools, or any source whence boys with a knowledge of music can be got. When a boy is recommended to Kneller Hall, he is kept for eighteen months or two years, thoroughly instructed in the use of his instrument, and returned to his regiment; and if he has talent and behaves himself, he has a good chance of eventually rising to the position of bandmaster. When a regiment goes from home on active service, if the absence promises to be short, as in the case of the Afhantee war, the band is left at home till its return; if the regiment is going on long service, the members of the band go with it and assist in ambulance duty, as for instance during the Indian Mutiny.

The sergeant-drummer in infantry regiments and

the sergeant-trumpeter in cavalry regiments is the *military* commander of the band, the bandmaster having authority only over the music, and the men as musicians. The various Guards' bands in London, the bands of the Royal Engineers, the Royal Artillery, and the Royal Marines at Chatham, Portsmouth, and Plymouth, are allowed more men than the line regiments. The Guards' bands have also the privilege individually of accepting private engagements, when these do not interfere with their duty, in plain clothes, in addition to the ordinary engagements as bands by 'permission of the commanding-officer.' The emoluments thus open to the men, induce a better class of musicians to remain in the service than would be the case were they restricted to their pay as soldiers. The bandsmen of line regiments have less opportunity of private engagements, and can only go in plain clothes by special permission. They have, however, their chance of band engagements, the receipts being divided among the band.

The duty of regimental bands is to play at regimental parades, at 'marches out,' to the officers at mess, and when required by the officers. Formerly the music required by the band had to be arranged and 'scored' by the bandmaster, but there are now many journals published (the earliest Boosey's *Military Journal*, 1846) with arrangements of all kinds of music for military bands, thus relieving the bandmaster from much of his hardest work. These journals are of great service to both military and amateur bands, bringing within the reach of every one the finest music, arranged by the very best musicians of the day.

Naval Bands.—Flag-ships only are supposed to carry bands, but other large ships (commanded by officers not less in rank than a post captain) usually also do so, at the option of the officers. They have generally from 10 to 15 performers, and are mostly supplied from the boy bands of training-ships, supplemented by retired army bandsmen who may join the ships for the purpose. As in the army, the officers provide a band fund, to which government contributes a maximum sum of £20 per annum, and from which the bandmaster's and bandmen's pay are supplemented and the other expenses met.

Volunteer and Amateur Bands.—The great development of the volunteer movement has led to a corresponding development in amateur bands, nearly every volunteer regiment possessing one. Their organisation is, as closely as the circumstances permit, identical with that of the regular army bands, and need not be further described. Other amateur bands are now common throughout the country, nearly every small town having its 'instrumental band.' Some of the amateur bands of Yorkshire and Lancashire, consisting mostly of working-men engaged in mills, iron-works, or collieries, are really good, executing all kinds of music in an astonishingly creditable manner, considering their opportunities for practice. Many districts have their annual brass band contests at which considerable sums of money are given as prizes. For other bands, see ORCHESTRA.

Banda, chief town of a district in the North-west Provinces, India, 95 miles SW. of Allahabad, on the right bank of the Ken River. The town, which is straggling and ill-built, but with clean, wide streets, has 66 mosques and 161 Hindu temples. Pop. (1881) 28,974. It is a great mart for cotton.—The district of Banda contains 3061 sq. m.; its chief product being cotton. Pop. (1881) 698,608.

Bandages are used by surgeons to keep a part of the body at rest, to apply pressure, or to retain dressings or apparatus in position. There are two

chief varieties—the roller, and the triangular handkerchief bandage. The former is that most used for applying pressure and retaining dressings: the latter for fixing splints and as slings, and as an immediate surgical appliance in cases of accident or emergency.

The Roller Bandage is a strip of calico, flannel, or elastic webbing, six yards long; its breadth should be one-fifth of the average circumference of the part to which it is applied. In applying it to a limb, it must commence at the extremity, and pass upwards without interruption towards the trunk. It must

cover the whole surface, and exert gentle and equable pressure throughout, especially in regions likely to be dependent, since swelling and discomfort occur at points where the bandage is absent or too slack; too tight bandaging, on the other hand, may hinder the circulation and lead to mortification of the part. Both edges of the bandage must be equally tight, or it will not lie smoothly on the limb, but will gape and tend to slip off. No two skin surfaces (e.g. two fingers) must be bound in contact, since the accumulation and decomposition

of cutaneous secretions between them will give rise to irritation. This can be avoided by interposing a layer of absorbent, antiseptic material, such as boracic lint. When a harsh and inelastic bandage is used, it must not be applied directly to the surface, but over closely fitting woollen hose, arm-gloves, &c., which mitigate its pressure and protect the skin. A soft bandage may be applied directly; elastic webbing must only be applied over thick dressings or layers of cotton-wool that distribute and equalise the strong pressure it exerts. A bandage will slip unless both its ends are secured. In commencing to bandage any part of a limb, fix the roller by passing it round alternately above and below the prominence of the nearest available joint; then cover the part to be bandaged by encircling it with coils of bandage applied consecutively from below upwards, each loop covering the upper two-thirds of that previously applied. In parts where the limb thickens rapidly from below upwards, the bandage must be frequently 'reversed' to make it lie smoothly. Holding steady the loops already applied, the bandage is folded sharply upon itself from above downwards, so that the external surface of the loop next applied is the same that was next the skin in the previous loop. This corrects the tendency to leave portions of skin uncovered in conical parts of a limb. The bandage is fastened by a safety-pin, which should traverse several layers of the roller and any texture introduced between the bandage and the skin. The toes and finger tips should be left uncovered; if they look dusky or become cold, it shows that the bandage is too tight, and must be at once loosened or removed.

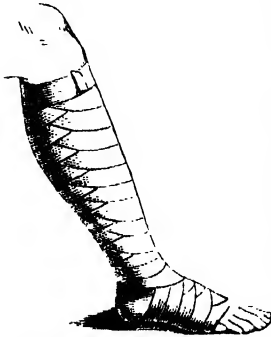


Fig. 1. - Roller Bandage.



Fig. 2.

The Handkerchief Bandage (fig. 2) is a triangular piece of cotton cloth, made by cutting a square yard of the material diagonally from corner to corner. It may also be constructed from an ordinary pocket-handkerchief, by dividing it in the same way, and combining the two small triangles thus produced into one larger triangle by tacking together two of their shorter sides (see fig. 2, B). When thus constructed, the bandage consists of a peak (fig. 2, A, P'), two sides (S'S'), two tails (T'T'), and a base (B'). This appliance may be used for a great number of purposes in addition to those for which the roller bandage is applied. If it be desired to fix dressings in position, and to cover a large area of the body surface, it is used unfolded. If it be required to apply pressure firmly

and locally, or to fix dressings, splints, or other applications on movable parts, it is folded into a broader or narrower cravat form, as shown in fig. 2, C, and is thus applied to the part in question. In folding the bandage, the peak is turned over, so as to touch the middle part of the base (C, 1), and the handkerchief is then folded upon itself longitudinally to one-half or one-third of its present breadth, according to the larger or smaller circumference of the limb it is intended to encircle, and the size of the area it is desired to cover. For most purposes the narrower form (C, 2) will be found most convenient, since it adapts itself more easily to the inequalities of the part to which it is applied. In its unfolded form the handkerchief is used as a covering for the head

(fig. 2, *a*), and as a support to dressings applied to the shoulder (*b*), chest (*c*), stump (*e*), hand (*f*), foot (*g*), and hip (*h*). In this form also it is used as the ordinary sling for injuries of the upper extremity (*i*), where the weight of the arm is supported by the patient's neck and shoulders, and the injured parts are thus saved from strain and kept at rest. If this be supplemented by a second handkerchief bandage, folded narrow, which encircles the chest and the injured arm above the elbow (*j*), the whole upper extremity is not only supported but kept firmly immovable; which adds greatly to the comfort and safety of a patient immediately after an accident, during his transference to a hospital or to his home. In its folded form it makes an admirable temporary support to injured joints, such as the wrist (*k*), ankle (*l*), elbow (*m*), and knee (*n*), and in wounds of the eye (*o*), scalp (*p*), arm (*q*), thigh (*r*), &c., while the careful application of such a bandage satisfactorily supports the jaw (*s*) in cases of severe bruising or fracture. One of its most important uses in the narrow cravat form is to fix improvised splints *in situ* in cases of fracture of the extremities (*t*, *u*, *v*, *w*, and *x*). In this form it is also used as a wrist or hand sling (*x*), where the wrist-joint only is injured, and alone needs to be supported, or where a wound of the hand necessitates that member's complete rest. In cases of severe bleeding from wounds of the extremities, it should be used as a *tourniquet* (q.v.). If the bleeding be of a *spitting* character, it implies that an artery of considerable size is divided. In this case the bandage must be made to encircle the limb higher up than the seat of the wound, and must be tightened by twisting (*y*) until the limb is completely constricted and the bleeding temporarily arrested, while immediate surgical assistance is sought for. If the bleeding be of an *oozing* character, the bandage is not applied higher up the limb than the wound, but over the wound itself. A stone or other hard substance is firmly wrapped in a piece of cotton cloth or lint and thrust into the wound, and the cravat-handkerchief applied around the limb at the part sufficiently tight to hold this extemporised plug in position (*z*). Here, the object is not to control the circulation of the whole limb, but to prevent the escape of blood from the wound. This can be greatly assisted by attending to the position of the wounded limb in relation to the law of gravitation. In such circumstances it is usually sufficient, after applying the plug and bandage, to support the upper extremity in a sling, and to prop up the lower extremity on a high pillow. Should this, however, prove ineffectual, it is well to try firm flexion of the joints above the wound, which usually stops the bleeding. If this too fail, the whole limb must be constricted by the twisted handkerchief as above described; which, however, one would gladly avoid if possible, since it is a source of great suffering to the patient. In securing the ends of the bandage, they should either be tied together with a 'reef' knot (*), which will hold firmly, in contradistinction to the 'gramm' knot (+), which tends to slip; or if the knot from its position cause discomfort to the patient, it should be dispensed with, and the two ends of the handkerchief sewn together with strong thread or sewing worsted. The figure represents the handkerchief bandage supplied by the St Andrew's Ambulance Association to its members for use as a 'first aid' to the injured in cases of accident and emergency.

Banda Isles, a portion of the Moluccas, consisting of 12 islands, 6 of which are uninhabited, about 50 miles to the south of Ceram. Their mean lat. and long. respectively are 4° 30' S., and 129° 50' E. Area, 17 sq. m.; pop. estimated at 500

Europeans and half-castes, and 6000 natives, mostly descendants of the emancipated slaves. The chief production is the nutmeg, the average annual export of which spice amounts to 1,460,000 lb., with a corresponding quantity—over 280,000 lb.—of mace. An active volcano, (Gmpong-Api (1744 feet), rises near the centre of the group. In 1801–14 the islands were acquired by the Dutch.

Bandajan, a pass over a range of the Himalayas, in Kashmir. It is amidst mountains of gneiss, and is covered with perpetual snow. The summit of the pass is 14,854 feet above the sea, and is in 31° 22' N. lat., 78° 4' E. long.

Bandana's, a kind of printed handkerchief of Indian origin, now extensively made in Britain, usually of cotton. The cloth is first dyed Turkey red, and then the pattern is made by discharging the colour with bleaching liquor in a powerful Bramah press. The pattern to be discharged is cut out on two plates of such metal (lead) as may not be acted on by the liquor, and of the full size of the handkerchief. A dozen or more are put in at once between the plates, and so many of these courses are entered together as fill the press, when the pressure is applied, and the liquor is run in on the uppermost plate, which is grooved on the upper side to receive it, and holed to pass it from plate to plate through all the cloth-folds in the press. The pressure on the cloth, to make clean work by preventing the spreading of the liquor, is enormous. The patterns in the real bandana style of printing are spots and diamond prints, the best suited for discharging, and even for these a pressure of 500 tons is required to work them clean. See CALICO-PRINTING.

Banda Oriental, a state of South America, originally settled by Spaniards from Buenos Ayres, claimed by Brazil, but, after a war, made in 1825 into the independent state of Banda Oriental del Uruguay, i.e. 'Eastern Bank of the Uruguay,' now usually called simply Uruguay (q.v.).

Bandel, ERNST VOX, sculptor, was born in 1800 at Ansbach, studied art at Munich, Nuremberg, and Rome, and from 1834 lived chiefly at Hanover, engaged, off and on, for forty years on his great monument of Arminius, near Detmold, 90 feet high, which was unveiled by the Emperor Wilhelm on 16th August 1875. He died near Donauwörth, September 25, 1876.

Ban-de-la-Roche, or STENTHAL, a valley of Lower Alsace, in the Vosges Mountains, noted as the scene of the labours of Oberlin (q.v.).

Bandelkhand. See BUNDELKHAND.

Bandello, MATTEO, an Italian writer of *novelle* or tales, was born about 1480 at Castelmovo in Piedmont. In early life he became a Dominican monk at Milan, but soon abandoned this vocation. After the battle of Pavia (1525) he was driven from Milan by the Spaniards, and settling in France, was in 1530 made Bishop of Agen. He died in 1562. Bandello's tales, 214 in number (4 vols. 1554–73; best ed. Milan, 1814), rank next to those of Boccaccio in Italy, and furnished themes to Shakespeare, Massinger, and other dramatists. They are distinguished by unaffected simplicity of style, fluency and vividness of narrative, and a harmonious brevity of periods. Often, however, they are very impure.

Band-fish (*Cepola*), a genus in the family Cepolidae in the blenny-form division of Acanthopterygious Fishes (q.v.). The body is much elongated and laterally compressed, and is covered by very small scales. The dorsal fin is very long, and consists like the anal of soft rays. The tail vertebrae are very numerous, and the whole structure of the body exhibits unusual delicacy,

so that specimens are seldom obtained in an uninjured state. All the species inhabit quiet depths, and are unable to contend with waves and currents. The snakelike form and the beauty of their colours make them objects of great interest. One species, the Red Band-fish (*C. rubescens*), not uncommon in the Mediterranean, is occasionally cast ashore by storms on the British coasts. It is about 15 inches long. Its brilliant appearance, when seen moving in the water, has suggested the names of Fire-flame and Red Ribbon, by which it is known at Nice. The home of the genus is in Japanese waters.

Bandicoot (*Perameles*), a genus of small marsupials, occupying in the fauna of Australia a place somewhat analogous to that of the much higher shrews in Europe. Like the 'native rabbit' (*Macrotis lagotis*) and the peculiar form known as *Cheropus*, the bandicoots stand midway between carnivorous marsupials like the Tasmanian Devil, and the vegetarian Kangaroos, rescuing the former in their dentition, the latter in the structure of the hind-feet. They have altogether 48 teeth, suited to their mixed diet of insects, worms, and roots, and have 10 upper incisors to 6 lower. In the fore-feet the three middle toes are long and clawed, the two outer rudimentary and clawless. The hind-feet are long and narrow, with only the fourth toe well developed.



Bandicoot (*Perameles nasuta*).

The fur is short and rough. The long head forms a pointed snout, the tail is rather short, the marsupial pouch is complete and opens backwards. They keep to the ground, making nests in the hollows. Their movements and habits are like those of hares or rabbits. The largest form (*P. nasuta*) measures about a foot and a half from tip of snout to origin of tail. Numerous species occur in Australia and New Guinea. Their ravages on farm-produce make them of some practical importance. See MARSUPIALS, and Gould's *Mammals of Australia*.

Bandicoot Rat, MALABAR RAT, or PIG-RAT (*Mus giganteus*), the largest known species of rat. The name is a corruption of the Telugu *pandikoka*, literally signifying pig-rat. The animal inhabits many parts of India, and is plentiful in Ceylon. It is chiefly found in dry situations, and often in hilly districts. It attains the weight of two or three pounds, and is 24 to 36 inches long, including the tail, which at the base is 2½ inches in circumference. The body is thick, and greatly arched, black above, grayish below. Its flesh is a favourite article of food with the coolies of India, and is said to be delicate, and much to resemble young pork. It feeds chiefly on grain and roots, and is very destructive in gardens. Its nests, when rifled, are frequently found to contain considerable quantities of rice, stored up against the dry season.

Bandiera, ATTILIO and EMILIO, two brothers of a Venetian family, lieutenants in the Austrian navy, who attempted a rising in favour of Italian

independence in 1843. The attempt was a failure, and they fled to Corfu; but, misled by false information, they ventured to land in Calabria with twenty companions, believing that their appearance would be the signal for a general insurrection. One of their accomplices had betrayed them, and the party was captured at once by the Neapolitan police. Attilio and Emilio were shot along with seven of their comrades in the public square of Cosenza on the 25th July 1844. Both were men of lofty spirit, and their enthusiastic patriotism breathes in every line of their letters to Mazzini, who was then in London. The fact that these letters were opened by authority of the British government aroused much interest in England in the fate of the brothers.

Bandinelli, BACCIO, the son of a famous goldsmith of Florence, and one of the best sculptors of his time, was born at Florence in 1493. He was an angry and jealous rival of Michael Angelo, whose grandeur of conception he strove to equal, and who is said to have retaliated his enmity by contempt. His genius, however, secured him many admirers and patrons among persons of distinction, and Pope Clement VII. even bestowed on him an estate. Among his best works, which all exhibit power, vigour, and skilful drawing, are his colossal group of Heracles with Cacus at his feet, his Adam and Eve, his copy of the Laocöon, and the exquisite *bassi-relievi* which adorn the choir of the Duomo in Florence, where he died in 1560. A very full account of his life is given by Vasari.

Bandit. See BRIGAND.

Band of Hope, the name first given about 1847 to societies of young people, pledged to abstain from all intoxicating liquors. The movement has spread, and now nearly every town and village of the United Kingdom contributes its quota of adherents. The United Kingdom Band of Hope Union (1855) had in 1887 affiliated with it 13,232 societies of juvenile abstainers, having 1,623,033 members. See TEMPERANCE.

Bandoline is a mucilaginous substance used for stiffening hair, and keeping it in shape or form. It is usually prepared from gum tragacanth, two ounces of which, when digested with a quart of rose-water for two days at a gentle heat, yield a translucent jelly, which is further perfumed by the addition of otto of roses, or oil of bitter almonds. It is also prepared by boiling Carrageen (g.v.) or Irish-moss with water, or by soaking quince-seeds in cold water for a day or two.

Bandon, or BANDONBRIDGE, a town of County Cork, Ireland, on the Bandon, 20 miles SW. of Cork by rail. Bandon was founded in 1608 as a Protestant colony by the first Earl of Cork, was incorporated by James I., and now belongs chiefly to the Duke of Devonshire. Brewing, distilling, and tanning are the chief industries. The pop., which was 6131 in 1871, had diminished to 3997 in 1881. Up till 1885 Bandon returned one member to the House of Commons. The river Bandon rises in the Carberry Mountains, and at its mouth forms the harbour of Kinsale. Spenser describes it as 'the pleasant Bandon, crowned by many a wood.' It has a course of 40 miles, for 15 of which it is navigable to Innishannon, 4 miles below Bandon.

Bandong, or BANDUNG, a flourishing commercial town in the centre of the western end of Java, in the vicinity of the volcano Gunung Gun-tour. Since 1864 it has been the capital of a province known as the Preanger Regencies.

Bandy Legs. See LEG.

Baneberry, or HERB CHRISTOPHER (*Actæa spicata*), is a native of the north of Europe, occurring rarely in the north of England. It is a

perennial herb, with leaves ternately compound, deeply serrate, the flowers in racemes, the berries black and poisonous. The root has been used in medicine, but is of dubious reputation; those of two North American species were in high esteem among the Indians, especially as remedies for snake-bites.

Banff (pron. *Banf*), a seaport and parliamentary burgh, the capital of Banffshire, on the Moray Firth, at the mouth of the Deveron, 50 miles NNW. of Aberdeen by rail; its former Low Town and Sea Town now form a continuous whole. On the right bank of the Deveron, 1½ mile ENE., is the fishing-town of Macduff, included since 1832 in the parliamentary burgh. Scarce a fragment remains of the old castle, in which Archibald Sharp was born; the present castle is a plain 18th-century edifice. Duff House, the seat of the Earl of Fife, was built in 1745 by the elder Adam. It has a noble collection of pictures, a fine library, and an armoury with the sword of the Gipsy freebooter, Al'Pherson, who was hanged at Banff in 1701. The Prince of Wales stayed here in November 1883. The public buildings include a town-house (1796), the county buildings (1871), a lunatic asylum (1865), 'Chalmers' hospital (1862), and a museum, of which Thomas Edward (1814-86), the 'Scotch naturalist,' was long curator. The harbour of Banff is inferior to that of Macduff, which was greatly improved in 1877. The chief exports are corn, cattle, salmon, and herrings, and coal is the principal import. With Elgin, Cullen, Inverury, Kintore, and Peterhead, Banff sends one member to parliament. Pop. (1851) 6042; (1891) 7578, of whom 3707 were in Macduff. See Inlach's *History of Banff* (1868).

Banffshire, a county in the NE. of Scotland, bounded N. by the Moray Firth; E. and S. by Aberdeenshire; W. by Elgin and Inverness-shires. It stands fifteenth among the Scotch counties, both in size and in population. Its greatest length is 59 miles, its greatest breadth is 31, and its area is 646 sq. m. The surface, especially in the south and south-east, is mountainous, interspersed with fertile valleys and fine pastures; but near the coast it is comparatively level. The chief mountain-ranges, rivers, and strike of the stratified rocks, run from south west to north-east, and the whole county is an extensive slope in the same direction, from the Grampians to the Moray Firth, into which the rivers flow. The coast is rocky, but not high, except to the east of Banff. Chief summits are the Bin of Cullen (1950 feet), Knock Hill (1409), Meikle Conval (1867), Ben Rinnis (2755), and, on the Aberdeenshire border, Ben Macduff (4296). The chief rivers are the Spey, which bounds a third of the county on the west; and the Deveron, 61 miles long, and mostly included within the county. The predominant rocks are granite, quartz rock, mica-slate, clay-slate, syenitic greenstone, graywacke, graywacke-slate, old red sandstone with fossil fishes, metamorphic limestone and serpentine. The serpentine near Portsoy has long been famous as the 'Portsoy marble.' Lead, iron, antimony, and plumbago occur in small quantity. The soil in many parts is very fertile, and highly cultivated. About 38 per cent. of the entire area is in cultivation, more attention being paid to the breeding of cattle than to crops. The manufactures are unimportant, Glenlivet whisky excepted. The herring-fishery is largely carried on; and the salmon-fisheries of the Spey and Deveron are very valuable, the Spey ranking after the Tweed and Tay as a salmon-river. The southern part of Banffshire is in the Highlands, the north being purely Lowland in aspect as in race-characters. Banffshire is divided into the districts of Enzie, Boyne, Strath-isa, Strathdeveron, Balveny, Glenlivet, and Strath-

avon. The chief towns and villages are Banff, Macduff, Portsoy, Keith, Cullen, Buckie, Dufftown, and Tomintoul. Banffshire, along with the counties of Aberdeen and Elgin, enjoys the Dick Bequest (q.v.) for parochial education. The county returns one member to parliament. Banffshire contains numerous remains of antiquity, as the old churches of Gaurie and Mortlach, and the ruined castles of Auchindoun, Balvenie, Boharm, and Findlater. The battle of Glenlivet (q.v.) was fought in 1594. Pop. (1801) 37,216; (1841) 49,670; (1881) 62,736; (1891) 64,167.

Bangalore, a fortified town of Mysore, in a district of the same name, 216 miles W. of Madras by rail. When Mysore was occupied by Britain in 1831, Bangalore was made the administrative capital of the state; and when in 1881 Mysore was restored to the rule of its maharajah, the British cantonment of Bangalore was specially exempted from native jurisdiction. Silk and carpets are the principal manufactures; and there is a brisk trade. Lying 3000 feet above sea-level, in the middle of the Mysore tableland, Bangalore has a healthy climate, the thermometer rising only twice above 90° in six years. It was a favourite residence of Hyder Ali; and in 1791 it was stormed by the British under Lord Cornwallis. Pop. (1871) 142,513; (1881) 155,857, of whom 29,521 were Mohammedans, and 17,430 Christians. — The Mysore district of Bangalore has an area of 2901 sq. m., and a pop. of (1881) 669,139.

Bangkok, the capital city of Siam, situated on both banks of the Menam, about 20 miles from its mouth, in 13° 38' N. lat., and 100° 34' E. long. The population is about 300,000, half of whom are Chinese, in whose hands is centred nearly all the trade of Bangkok, which is large, as is shown by the commercial returns. The exports of Bangkok (almost those of all Siam) had in 1885 a value of \$9,400,000; and the imports, \$6,800,000. In 1884 they were rather larger. For their right to trade here, the Chinese pay a poll-tax of about \$3 on entering the kingdom, and a similar sum is collected from them every three years. The payment of this tax exempts them from the half-yearly military servitude which all other oriental strangers resident in Siam are required to give. The approach to Bangkok by the Menam, which can be navigated by ships of 350 tons burden, is exceedingly beautiful. As the town is neared, numerous temples present themselves, and floating-houses become common; and finally, the whole city, with its rich gardens, and shining temples and palaces, bursts full upon the view. A large number of the houses float on rafts, in rows three and four deep. To build on the shore is now a royal privilege, shared only with a few important noblemen. The land-houses are raised upon piles, 6 or 8 feet from the ground, and are reached by rude ladders. The floating-houses are made of bamboo boards, wicker-work, or palm-leaves, and have generally a veranda in front, with a small wing at each end. The circumference of the walls of Bangkok, which are 15 to 30 feet high and 12 broad, is about 6 miles. The internal traffic of Bangkok is chiefly carried on by means of canals, there being only a few passable streets in the whole city. Horses and carriages are rarely seen except in the neighbourhood of the palaces. The chief interest of the kingdom of Siam, according to Sir John Bowring, concentrates itself in Bangkok. Bangkok is the constant residence of the king. The palace is surrounded by high walls, and is nearly a mile in circumference. It includes temples, public offices, accommodation for some thousands of soldiers, with their necessary equipments, a theatre, and rooms for about 3000 females, 600 of whom are the wives of the king.

The famous white elephant has also a place within the palace. Throughout the interior are distributed the most costly articles in gold, silver, and precious stones. The temples of Bangkok are innumerable, and decorated in the most gorgeous style, the Siamese taking a pride in lavishing their wealth on them. Some of them, according to the Catholic bishop Pallegoix, have cost more than 4,000,000 francs (£160,000). The priests who swarm in the city are alone estimated at 20,000. In the neighbourhood of Bangkok are iron-mines and forests of teak-wood. The chief exports are rice, sugar, pepper, cardamoms, sesame, hides, fine woods, ivory, feathers, and edible birds'-nests. The imports are tea, manufactured silks and piece-goods, opium, hardware, machinery, and glass wares. In 1885, 407 vessels of 208,092 tons cleared the port, of which 195, with a tonnage of 134,398, were British. Among recent evidences of progress may be mentioned the erection of steam-mills, the introduction of gas into the royal palaces and many noblemen's houses, and the establishment of a regular mail to Bangkok in 1884, which has been followed by Siam joining the International Postal Union, July 1, 1885. Bangkok is now also connected with Burma and Cambodia by telegraph, and is the centre of a local system of some extent.

Bangor, an episcopal city, borough, and seaport of Carnarvonshire, North Wales, on the SE. shore of the Menai Strait, 60 miles W. of Chester. The grandeur and beauty of the surrounding scenery has long made it a favourite resort, and the opening of the Chester and Holyhead Railway (1850), on the great line of communication from London to Dublin, greatly promoted its prosperity. The town has of late years been greatly improved, and mostly rebuilt. Its chief trade is derived from the great Penrhyn slate-quarries, 5 miles distant, which employ 2000 men. The slates are exported to all parts of the world, and also manufactured at Bangor into tables, chimney-pieces, &c. Pop. (1891) 9892. Bangor unites with Carnarvon, &c. in sending one member to parliament. It is a place of great antiquity. In 525 St Deiniol founded a college here; and in 550 he became the first bishop: the cathedral founded by him was thrice destroyed, in 1071, in 1282, and in 1402. The present cruciform edifice, built between 1496 and 1532, was 'unequalled in meanness' amongst the cathedrals of the United Kingdom, until in 1869 Sir Gilbert Scott began to restore it, and it was reopened in 1880. From a Late Perpendicular structure it has since been transformed to much what it was at the beginning of the 14th century—a dignified cruciform pile, with a low western tower and a new (unfinished) central spire. In 1883 Bangor received a municipal charter, and the University College of North Wales was opened here in 1884.

Bangor, a small seaport and watering-place in County Down, on the south side of the entrance to Belfast Lough, 12 miles ENE. of Belfast by rail. Pop. (1881) 3006. St Cungall in 555 founded Bangor Abbey, which, in the 9th century had 3000 inmates, and which forms the subject of an interesting monograph by the Rev. Charles Scott (2d ed. Belfast, 1887).

Bangor, a city and port in the state of Maine, 246 miles N.E. of Boston by rail, on the Penobscot, about 60 miles from its mouth, and at its confluence with the Kenduskeag, which affords extensive water-power. At spring-tides, which here rise 17 feet, the harbour is accessible from the sea for the largest vessels, and as the navigation cannot go higher, Bangor is one of the largest lumber depôts in the world, absorbing and monopolising the trade of the heavily timbered basins of the

Penobscot and its tributaries. About 200,000,000 feet of lumber are annually shipped from Bangor during the season of eight months. Bangor possesses a custom-house of granite, several churches, a theological seminary, foundries, planing and sawing mills, furniture factories, &c. Bangor has also some shipbuilding, and foreign and coasting trade. Under English rule the place was known as Kendaskeag; its present name was taken from the well-known psalm-tune, a favourite of one of its ministers, Seth Noble. It was incorporated as a city in 1834. Pop. (1870) 18,289; (1880) 16,856; (1890) 19,103.

Bangorian Controversy. Dr Benjamin Hoadly, Bishop of Bangor, in a sermon preached before George I. in 1717 advanced opinions on the power of the church, by denying the authority of the church over the conscience. He thus drew on himself the fiercest opposition from the advocates of ecclesiastical authority, and provoked a long and keen controversy. In one month as many as seventy-four pamphlets were published on the subject. See HOADLY.

Bangor-iscoed ('Bangor below the Wood'), a Welsh village, beautifully situated, in a fertile and richly wooded country, on the right bank of the Dee, in a detached portion of Flintshire, adjoining the counties of Chester and Salop, 5 miles SE. of Wrexham. Pop. of township, about 550. It was once the seat of one of the largest monasteries in Britain, founded before 180 A.D., and containing 2400 monks in the time of St Augustine. To distinguish it from Bangor in Carnarvonshire it is sometimes called *Bangor in Maclor*.

Bangsring (*Tupaia*), a family of arboreal insectivorous mammals, sometimes known as squirrel or tree shrews. There are two genera—*Tupaia*, with numerous species, of which the larger are 8 or 9 inches long; and *Ptilocercus*, with a single species, the Bornean pintail. They are all oriental animals, and range from the Khasia Hills in India, to Java and Borneo. The fur is soft and glistening, and a long bushy tail is generally present. They are restlessly active during the day, searching for insects and fruits. Two of the largest species are the Tana (*T. tana*), with a feathery tail, in one variety of a bright golden colour; and the Ferruginous Bangsring (*T. ferruginea*), widely distributed in the Malayan region. The soles of the feet in the latter are plated like those of geckos, and give the animals a sure grip of a branch. See INSECTIVORA.

Bangweo'lo (also called Bamba), a great Central African lake, discovered by Livingstone in 1868, which is 150 miles long by 75 in width, and 3700 feet above the sea. The Chambese, which flows into it, and the Luapula which issues from it, constitute the head-stream of the Congo. The shores are flat, and parts of the lake are mere marsh. In the NW. part are four large islands, inhabited by the Mboghwa, a race of fishermen and herdsmen. On its south shore Livingstone died.

Banialu'ka, a town of Bosnia, picturesquely situated on the Verbas, in a fine forest district, 54 miles SE. of Novi by rail. It is strongly fortified, and, besides some Roman remains, contains warm baths, forty-four mosques, important powder-mills, and about 10,000 inhabitants, of whom some two-thirds are Mussulmans.

Ban'ian (from the Sansk. *banij*, 'a merchant'), a member of a Hindu merchant-caste, most numerous in Bengal and the North-west Provinces of India. The name was originally applied more particularly to those from the province of Guzerat,

many of whom had settled early in Arabian ports for purposes of trade; but was frequently extended by early writers to all Hindus in Western India. This class, which in 1881 numbered as many as 3,275,921 souls, carries on a very extensive trade, by means of caravans, with the interior of Asia, even to the borders of Russia and China. Contrary to the general custom of the Indian people, these merchants travel much, and the establishments and counting-houses of Indian Banians are to be found in almost every commercial town of any note in Asia, whilst in Africa they have recently become identified with the slave-trade. Generally speaking, those with sufficient capital subsist solely by money-lending, charging usurious rates of interest; the poorer classes open retail shops, or hawk their goods about the country villages. The members of the caste are mutually helpful, even advancing money to one another at reasonable interest.

Ban'ian Days, a sailor's phrase, meaning days when no meat is served out, so called from the abstinence from flesh of the Banian (q.v.) traders.

Ban'ian-tree. See BANYAN.

Banim, JOHN, Irish novelist, born at Kilkenny in 1798, in 1813 went up to Dublin to study art, and two years later became a drawing-master in his native town. His youth was darkened by an unhappy love-affair; but having achieved some success as a playwright (1821), having married, and settled in London, he produced, in conjunction with his brother Michael, the *Tales of the O'Hara Family* (6 vols. 1825-26), which were followed by *The Croppy*, *The Denounced*, *The Smuggler*, *The Mayor of Windgap*, *Father Connell*, &c. In 1836 general sympathy having been attracted towards Banim's privations, occasioned by disease that precluded all literary exertion, a pension of £150 was awarded him, which was afterwards further increased by £40 for the education of his daughter, an only child. He died in poverty, 13th August 1842, at Windgap Cottage, near Kilkenny. His brother Michael was born in 1796, and died 30th August 1874. Banim failed in his attempt to portray the manners and frivolities of the higher classes; but none of his predecessors—Miss Edgeworth, Lady Morgan, or Crofton Croker—succeeded in depicting so vividly and truly the Irish peasant, with his picturesque peculiarities in his sufferings and errors. Although generally happy in the plot and development of his story, he is too much disposed to dwell on the horrible. His denunciations may be well founded, but they mar the poetic effect. Banim was also not quite free from a somewhat tiresome minuteness of description, and his imitation of Scott is frequently very palpable. See P. J. Murray's *Life of John Banim* (1857).

Banishment (the act of putting under ban, 'proclamation,' as an outlaw) is a technical term in Scots Criminal Law for the punishment of sending out of the country under penalties against return. This punishment was formerly much used in various forms—e.g. banishment to the plantations or colonies; to England (even after the Union); from a particular county in Scotland, &c. Sometimes capital punishment was commuted to banishment for service in a foreign war. The old Scots doom of deportation was gradually merged in transportation under various British statutes. At present banishment is still the statutory sentence in cases of celebrating clandestine marriages. The idea of banishment occurs in the ostracism and *petalism* of Greece, and the relegation, exile, and deportation of Rome. It was generally accompanied by forfeiture of civil rights. In England voluntary banishment was called Abjuration. See OSTRACISM, OUTLAWRY, PRISONS.

Banjermassin', a former sultanate on the S.E. of Borneo, with an area of 5928 sq. m., and a pop. of about 300,000, chiefly Mohammedans. Tributary to Holland since 1787, it was annexed on the death of the last sultan in 1857, and is now governed by the Dutch resident for the south and east of Borneo, who has an assistant at Martapura, where the sultans formerly lived. Banjer-massin is watered by large rivers and intersected by a chain of mountains, in several parts rising to 3000 feet. Excellent small-arms are manufactured. The products are pepper, wax, edible nests, rattans, benzoin, dragons' blood, coal, iron, diamonds, and gold dust.

BANJERMASSIN, the capital of the residency, is built on the island of Tatas, about 15 miles from the mouth of the Banjar or Barito; pop. 30,000. The town is subject to frequent inundations, and the houses are raised on piles, most of the traffic being carried on in boats. The trade, which is considerable, is mostly in the hands of the Chinese, and the imports include piece-goods, gunpowder, opium, rice, sugar, salt, Chinese porcelain, silks, and a few horses from Java.

Banjo (originally a mere negro mispronunciation of *bandora*, derived through the medium of Spanish or Portuguese, from Lat. *pandura*, Gr. *pandoura*, a three-stringed musical instrument), an instrument of the guitar kind, played with the fingers, but without frets to guide the stopping. It has a long neck; a body like a drum, of parchment stretched on a hoop, and without a back; and from five to nine catgut strings. It has become known principally through its use by the coloured minstrels of the United States, a company of whom came to England in 1846; and it is at present on the increase in popularity. See NEGROES.

Bank Holidays, appointed by Sir John Lubbock's Act of 1871, fall in England and Ireland on Easter Monday, Whit-Monday, the first Monday in August, and 26th December; in Scotland, on Christmas and New Year's Days, Good Friday, and the first Mondays of May and August.

Banking. The term bank (Fr. *banque*; Ital. *banca*, 'a bench,' 'a tradesman's stall,' 'a bank') denotes a building in which the species of financial business now to be described is carried on, and is also applied to corporate bodies conducting that business. A banker is, primarily, a person engaged in that business on his own account and responsibility. In the case of joint stock companies, the expression is applied to the principal officers in charge of the business. Banking denotes the business itself, which is not specifically either a profession or a trade.

The earliest known bank was the firm of Egibi & Son, who seem, from clay tablets recently discovered near Babylon, to have conducted an important advance, exchange, and general financial business in that city from about 700 to 600 B.C., and subsequently; but it does not appear to have been definitely ascertained how far the character of their business approximated to that of modern banks. The Chinese understood the use of paper-money centuries before the European nations, and are said to have indulged in the practice to excess, and to have established a bank of issue about 1000 A.D. Banking in ancient Greece developed so far as to include deposits at interest and letters of credit, as well as advances. The Romans derived their knowledge of banking from the Greeks. But banking, as now understood, did not commence before the 12th century, when the Bank of Venice was established. Sir John Lubbock thinks that the first real bank was that of Barcelona, founded 1401; and that 'the Bank of Stockholm (1668)

was the first bank in Europe to issue bank-notes. Other early banks were the Bank of St George at Genoa (1407), and the Bank of Hamburg (1619). The Bank of Amsterdam (1609) was the great warehouse for bullion during the 17th century, taking charge of coin and bullion lodged, for which receipts, transferable from hand to hand, were granted; expenses being met by direct charges and a deduction from the nominal value of the sum credited in the books. But money lying in such banks was unproductive and costly to customers. With the advancement of social economy, improved means of communication, and increased mutual confidence, banks of this class are no longer needed, and have passed away. The era of real modern banking commences with the 18th century.

Banks used to be classed as *deposit*, *discount*, and *circulation*, those just referred to being of the first class originally, and gradually developing the other departments. A more convenient division for the present time is into *public*, *joint-stock*, and *private*, all three conducting every description of banking business, except that many of the two last named do not issue notes. Public banks are established by states to fulfil the functions of centres of credit and holders of the ultimate reserve of legal tender (coin). The mediæval public banks were managed by the city corporations, and had no specific capitals; but those of the present time are incorporated companies with more or less close connection with the governments of their respective countries. Joint-stock banks are incorporated banking companies without such connection or responsibility; and private banks are unincorporated partnerships.

A banker lends money at interest, usually for short periods, on satisfactory security, and receives money on deposit, for which he sometimes allows interest and sometimes does not. A banker does not hoard all the money deposited with him; he gives the greater portion out on loan. The advantages accruing to society from the operations of banking are thus immensely increased. A banker receives from all around him sums of money, both small and great, which would otherwise be useless in the coffers of the owners, and lends it to those who can employ it to advantage and could not otherwise obtain it. Capital hitherto lying useless and unproductive becomes through his agency useful and productive. The direct advantages arising from such transactions are considerable. The banker, if the money is allowed to lie with him for some time, will pay the depositor interest upon it, will lend the amount to a borrower who will engage in some business transaction with it and make a profit thereby; and the banker himself will make a profit in the difference between the interest allowed to the depositor and that charged to the borrower. But besides the direct advantages, the indirect advantages are not less important. With the money thus lent out, manufacturers can purchase raw material to be worked up, and procure food and clothing for their workmen; and traders can go into the markets and purchase commodities for resale. Commodities are thus more quickly turned to useful purposes, and a stimulus is given to the production of more. But a banker deals not only with the money of others; he uses money belonging to himself. This is his *capital*. Few would be found to deposit their money with a person known to possess none of his own. If he should lend deposits to those who fail to repay them—that is, *make bad debts*—he has the means from his capital of replacing the deposits thus lost.

The services that a banker performs as the cash-keeper of his depositors are very great. In the case of persons not themselves in business, it is

quite usual for a banker to make all their money-payments, beyond their small daily expenditure, and to receive the money payable to them. The money transactions of such persons are thus contained in their banker's books. This is effected by the depositor giving cheques or orders on his banker for the sums he has to pay; and by handing to him all the *cheques* or orders the depositor receives for sums payable to himself. Suppose a person's income derived from dividends on government stock; he may give a *power of attorney* or authority to his banker to uplift the dividends for him. These are received by the banker as deposits, and are drawn out by the depositor as occasion occurs, by cheques issued by the depositor to those to whom he requires to pay it away. So he may receive money due to him by a cheque given to him by his debtor. This cheque he sends to his banker, who will obtain payment. If both persons deal with the same banker, a simple transfer in his books will carry through the transaction; and if the bankers be different, and each has received, in the course of his business, as is always happening, cheques on the other, there will be a set-off between them; and two payments will be made as well as two deposits, without trouble to the persons concerned, and without the employment of any money. But this mode of managing one's pecuniary transactions is not confined to the case of those not engaged in business; on the contrary, it is followed on a scale out of all proportion greater in carrying through the money transactions of those in business or trade in the principal industrial countries.

Besides thus performing the function of cashiers to their depositors, many banks allow interest on deposited money. The rate allowed is, of course, always less than that received by the banker. Frequently a depositor bargains with the banker not to draw out his deposit without previous notice, longer or shorter as may be agreed on; and in this case the banker will allow a higher rate of interest than when the deposit is repayable *on call*—that is, at any time, without previous notice. The practice of allowing interest on deposits has prevailed in Scotland since 1729, but in England is of later growth, and not invariable; the rule there being rather to allow interest on fixed deposits only, and to allow no interest on money at call or on current accounts. It has led, of late years, to a great increase in the amount of deposits. Many persons are content with the low rates of interest which banks give, in place of the higher rates which may be obtained from individual borrowers, or the greater return which may be received if they traded on their money; believing their money to be safer and more readily obtainable.

Occasions are always occurring for withdrawing deposits, as well as making them. Traders and commercial men, for example, day by day, deposit with their bankers the drawings or sums of money which they receive in the course of their business; and, on the other hand, day by day, draw out such sums as they require to pay away in purchases of goods, in wages, rent, and other expenditure. A bank, therefore, while continually receiving deposits, is continually repaying deposits; and the amount uncalled for is subject to a daily fluctuation. At one period of the year, or in a certain condition of trade, the amount of deposits may be high; at another, low. As it is a principle, at the very root of banking, that money deposited shall be returned, either on demand, or punctually at the expiry of a stipulated notice, it follows that banks must always have in their coffers as much of the money deposited with them as there is the least likelihood of being called for by depositors. When business is in its ordinary condition, a bank can,

after some experience, approximate pretty nearly to the amount of the greatest demand for a return of deposits throughout the year, and provide accordingly. But sometimes the credit of a bank becomes doubted, either from causes peculiar to itself, or on occasions of a *panic* or general distrust, when all who own money wish to have it in their own possession. In these cases, there is a *run* on the bank for repayment of its deposits, and the amount called for may be far beyond the maximum demanded in ordinary times. If the bank has not retained in its coffers, or held otherwise, available funds sufficient to meet the demand, it is said to *suspend payment*; and, as a general rule, it must wind-up its business; the confidence of the public that it will in future restore its deposits on demand being now destroyed. There are two prime rules in safe banking: the one is, that the bank shall lend its deposits only on undoubted and readily realisable securities, however low the profit; and the other is, that the bank shall retain a sufficient amount of its resources—and this is called the *banking reserve*—to meet the possible demands of the depositors, even in cases of a run, although there may be no reason to expect one; for when a run comes, it seldom casts its shadow before. But it is evident that the greater the *reserve* of a bank, the less the amount of deposits which it can lend out and draw interest for; hence the temptation which banks lie under of imprudently lending out too great a proportion of their deposits; and it is yielding to this temptation which almost always precipitates the failures of banks.

The *reserve* of the banking department of the Bank of England is always in coin, or, what is the same thing, in notes against which there is coin lying in what is called the *issue* department of the bank. In the case of all other banks in this country, the reserve is only partly in coin; sometimes the proportion of coin is very small. A great portion of the reserve is generally in Bank of England notes (except in Scotland and Ireland), equivalent, of course, to coin. A portion is invested in the shape of government stock. In this way, the banks obtain a return on a portion of their reserve, in the dividends or interest paid by government on the stock this return being less, indeed, in the usual case, than if the bank had lent out the money in the ordinary course of business, but better than no return at all, as must be when the coin or notes are lying idle. The reason why government stock, in Great Britain, is a safe reserve is, that it is sure to command a purchaser at all times. If there be a run on a bank, it immediately finds a purchaser for the stock, and with the price, whether paid in gold, or in Bank of England notes, the only other legal tender, it meets the demands of its depositors. Sometimes a bank has its reserve in the form of a deposit at the Bank of England; or, if a provincial bank, with some London bank which has its own reserve there. From the Bank of England being the channel through which, directly or indirectly, payments are made and moneys received by other banks, it is more convenient for them to have their reserve lying as a deposit in it, than lying as gold within their own walls. In the case of a demand on their reserve, the banks will draw out their deposits, in notes, or, if gold be in demand, in gold, from the Bank of England. Whether, therefore, the reserve of a bank is invested in government securities, or is deposited in the Bank of England, or is in Bank of England notes, it is from the coin in that bank that the gold comes in the case of a run. It is apparent from this that it is essential to the stability of all banks in this country, so long as they themselves do not keep a sufficient reserve of coin in their coffers, that the Bank of England shall

always be possessed of coin, and never be unable, on demand, to pay its depositors in gold, or to give gold in exchange for all its notes that may be presented to it. It may be added, that while banks gain, through the annual dividends, in keeping their reserve in government stock, they run the risk of loss in the event of their requiring to sell in times of panic. For at such a time, when many securities become unsaleable, and all of them suffer depreciation in value, government stock itself falls in price, although less so than the others. Banks often invest portions of their reserve in other stocks than government stock. The higher return thus obtained is, however, outweighed by the greater risk of depreciation in value in times of panic.

Banks make their loans chiefly in the form of *discounts*—that is, upon bills of exchange. Commodities in the wholesale market are generally sold on credit. The buyer promises to pay the amount at a certain date to the seller, and his promise is contained in a bill of exchange. The seller transfers it to a bank, which, on the faith of it, advances the amount in loan to him, less *Discount* (q.v.)—that is, interest of the money till the bill be due. This is called *discounting*. But banks lend on other securities. A holder of government stock, for example, will obtain a loan on the security of his stock; the banker being entitled to sell it, and repay the loan from the price, if the borrower fail to make punctual payment. So also, the holder of stock or debentures in any public company, as a railway, will, where the company is believed to be in a sound condition, or the security is saleable, and no liability attaches to it, obtain a loan from a bank. The owners of commodities lying in a public warehouse may obtain a loan on depositing with the bank the *warrants* or certificates of ownership. Loans, too, are occasionally made for short periods on the mere note of hand of the borrower, when the banker is satisfied of the ability of the borrower to repay the money. It is seldom in Scotland that banks lend on mortgages over land. Borrowers, in these cases, generally take loans to lie unpaid for a few years; but to have his money locked up in that way does not suit the business of a banker. Where a banker finds the security which he has received to be insufficient, and repayment of the loan is not forthcoming, he will, of course, to avoid making a bad debt, take any other security the debtor can give him—such as a manufactory or a mine. Banks have in this way occasionally become involved in manufacturing and mining transactions, in order to make more money of the securities than they would have done by an immediate sale of them; and have suffered great losses in consequence. It is not to be supposed that banks always abstain from making loans when the security is known to be doubtful; far from it: banks, like other commercial establishments, have been, on many occasions, recklessly managed. In trying to push business, they have made loans on insufficient security; and banks are under strong temptation, when a trader largely indebted to them is approaching bankruptcy, to sustain his credit by additional advances, in the hope that he may retrieve his affairs, and pay in full both the old and the new advances. The result is often the loss of both. Conduct of this kind has been the ruin of many banking establishments in England, of several in Ireland and Scotland, and elsewhere.

We have hitherto been treating of the *deposit* and *loan* departments of banking; but many banks also *issue notes*. In the case of loans from capital, the banker has no greater profit by the transaction than if he had lent out his money in any other way, equally safe, and involving the same amount of trouble. If from deposits, the interest he receives, in

so far as it exceeds the interest, if any, paid to the depositors, and a rateable proportion of the expense of carrying on the business of the bank, is pure gain to him. But a banker may give the loan from his own notes, and in that case his gain is still greater. A bank-note is simply a printed promise by the bank issuing it, to pay to the bearer, on demand, a sum of money—that is, in coin of the realm. Of course, the borrower would not accept a loan from a bank in its own notes, unless he believed that it could redeem its promise of paying in coin, and that the public were of the same opinion; for whenever a suspicion arises that the promise will not be made good, the note ceases to pass from hand to hand as freely as coin. But (under a system of free issue) when the loan is accepted in a bank's own notes, it is evident that the interest which the bank draws for the loan of its promises to pay is pure profit, except the rateable proportion—as in the other cases—of the general expenses, the cost of manufacturing the notes, and the government stamp-duty. In other words, a bank whose issue of notes is unrestricted, draws nearly as much income from loans of its promises to pay, as from its loans in legal tender. The motive which a bank has to extend its issues on loans is therefore apparent, so long, of course, as it is not compulsory on it to retain unemployed in its coffers as much in gold as it issues in notes. Unrestricted issues are now, however, a system of the past.

But it does not follow that when a bank makes a loan in its own notes for a definite period, it will really obtain the benefit of the whole of the interest on it for that period; for the borrower does not apply for the notes that he may keep them beside him, but that he may pay them away in making a purchase, or in liquidating a debt, and this, most commonly, on the very day he receives them. If the person to whom the notes are thus paid by the borrower has himself no payment to make, he may return them to the bank that issued them, to lie there on deposit. If the bank pays interest on deposits, as most banks do, then out of the interest drawn by it on the original loan, it will have to pay interest to the depositor of the notes; in other words, the loan is no longer a loan of notes, but a loan from deposits. Or the person receiving the notes from the borrower may immediately present them to the issuing bank for coin, instead of depositing them. Here, too, the loan that was made in notes is converted into a loan of coin, that was in reserve from previous deposits, or that was part of the bank's own capital. In these cases the bank obtains no advantage whatever in having made the loan originally in its notes. It might equally well, so far as profit is concerned, have originally made it in gold from its reserve of deposits or capital. Notes generally find their way back to the issuing bank through other banks, into which they have been paid as deposits, or in repayment of advances. These banks suffer the loss of profit or interest on the amount of the notes thus received by them so long as they keep them; they therefore immediately present them to the issuing bank for payment, that they may get the use of the money represented for the purposes of their own establishments.

There are two checks which prevent a bank issuing notes to any extent it pleases. In the first place, there must be a demand for its notes by borrowers. It is only to people in good credit, and likely to make a profitable use of them, that a bank will lend its notes, and such people will not take an increase of loans unless trade be increasing, and new opportunities be presenting themselves for profitably employing the notes borrowed. True, banks, when imprudently conducted, frequently lend to reckless persons, who overtrade and become bankrupt. But this is not done more through the

medium of the notes than otherwise. In the second place, the immediate return of the notes, chiefly through other banks, is a check to its issuing more notes than it has a reserve to meet. This return of notes through banks is called the *exchange* of notes—the notes issued by a bank being returned to it in exchange for the notes of other banks held by it.

Besides issuing its notes in loans, a bank may issue them in repayment of deposits. In this case, there is the same profit to the bank as in the other case. The bank gets the use of the money which was originally lodged with it, without having to pay interest for it, the deposit having now been repaid in its notes. But here, too, these notes are equally liable to be returned to the issuer as when they are issued on loans.

Of all the notes issued, in whatever way, by banks, a certain amount is not returned to them, but is kept in circulation, being what is required by the necessities of the public for use as money, passing from hand to hand. It is of course on this portion that the banks make their profit; and, in consequence of this profit, they are able to afford banking facilities to the public more cheaply than they could otherwise do. The profit is just the interest on the money represented by the notes in circulation—less expenses and the loss of interest on an unemployed reserve kept from prudence, or by the requirement of law, to meet a return of notes. This interest is paid by the persons who originally borrowed these notes from the banks, and who have not repaid them; or if the banks have repaid deposits with the notes, the interest is paid by those to whom they lent what was originally these deposits. The amount of the bank notes in circulation varies at different periods of the year; at term times and quarter-days, when more payments than usual are made, there is a greater quantity of money required by the public than at other times, and the notes in circulation increase in amount. This addition to the circulation is drawn from the banks by depositors or borrowers. After it has served its purpose, this additional quantity gradually returns to the banks as deposits or in repayment of loans. If the credit of an issuing bank is at any time suspected, the holders of notes will present them for gold, just in the same way as its depositors will call for a return of their deposits; and this risk must be provided against by a corresponding increase of its general reserve, on which, of course, it makes no profit. It has been generally imagined that when issuing banks suspend payments on a run, the run is one on the part of their note-holders; but this is only a popular error. In a well-established bank, the amount of its notes in circulation is of little importance compared to its deposits; and though the holders of small sums in notes may be more apt than depositors to take alarm and rush in a panic to the bank for gold for its notes, a small proportion of its depositors suddenly demanding a return of their money in gold as effectually drains a bank of its reserve, as if its whole circulation were to be at once presented to it for gold.

Bankers perform another very important function: they *remitt* money from one place to another. One illustration will serve to explain how this is managed. A debtor in Edinburgh makes a payment to his creditor in London in this way: he pays the money to a banker in Edinburgh, who, for a small charge, called the *exchange*, gives him a draft for the amount on a banker, his correspondent, in London. The debtor transmits the draft to his creditor, who presents it to the London banker, and receives the money from him. No actual transmission of the money, however, takes place, for there are debtors in London requiring to

pay money to creditors in Edinburgh, and these debtors effect the payment by giving the money to the London banker, and obtaining his drafts on the Edinburgh banker. The one set of drafts are thus set off against the other. Not only may remittances between two places be thus made without the use of money, but the payments in both places may also be made without it. The debtors may pay for the drafts by cheques on the banker who grants them, and the creditors may get the drafts placed to their credit, and receive the money by drawing cheques on the banker by whom they are made payable. For another function of banks, see **MARGINAL CREDITS**.

The large amount of money transactions carried through, without the intervention of coin or bank-notes, in a country like England, is inconceivable to those not engaged in business pursuits. The manner in which these transactions may be effected without money, would be at once apprehended, if all persons in the same locality dealt with the same bank, and if all the banks scattered throughout the kingdom were only branches of the same establishment. But in practice matters are so managed as if this were the case. The cheques, bills, or other drafts which come into the hands of a banker, drawn on (that is, payable by) other bankers, are set off and liquidated by drafts, which they have received, drawn on him. The balance or difference only is paid in money. In London, the centre of the money-world, there is an establishment called the Clearing-house (q.v.), of which most of the London banks are members. There, at a fixed hour daily, attendance is given by a clerk from each of these banks, who presents all the drafts immediately payable which his bank holds on the others; the balance or difference, on the whole, for or against each bank is ascertained; and the bank which holds a less amount of drafts on others than they hold on it, pays the difference by cheques on the Bank of England. For the nineteen years 1868-86, the average total amount of documents passed per annum was £5,305,234,000; the lowest annual total was £3,425,185,000 in 1868; and the highest, £6,357,059,000 in 1881. There are similar clearing-houses in some provincial towns.

Bank of England.—This bank, the most important in the world, was projected by William Paterson (q.v.), and was incorporated July 27, 1694. It was constituted as a joint-stock association, with a capital of £1,200,000, which was lent at 8 per cent. interest to the government of William and Mary, at the time in a state of embarrassment. At its very outset, therefore, the Bank of England was a servant of government; and it has retained this character, but in a diminishing degree, through all the stages of its subsequent history. At first, the charter of the bank was for eleven years only; but in consequence of the great services of the institution to government, its charter has been at various times renewed. The last renewal was in 1844, and the charter of that year still subsists, its terms being subject to modification or revocation by the legislature at pleasure. By the Act or charter of 1844, the Bank was divided into two departments—the *issue* and the *banking*. What led to the division was this: it was supposed that, when a foreign drain of gold from England set in, it would, if the currency or circulation in this country had been purely metallic, have produced a contraction of the circulation, and a consequent fall of prices, and, as an ultimate result, the cessation of the drain. It was further supposed that banks could issue their notes to any extent they pleased; that their excessive issues increased the currency, and therefore increased prices, which in their turn led to foreign drains; and that, on the occasions of these drains, the continued issues prevented the natural

and desirable contraction of the circulation, and aggravated the commercial convulsions occurring at such periods. The object of the Act of 1844 was to prevent issues of notes beyond a certain amount, unless against an equal amount of gold held by the issuing bank, so that the mixed currency of notes and coin might thus expand and contract like a self-acting metallic currency. Experience, however, has shown, that when these foreign drains occur, the gold exported is taken chiefly from the reserves in the Bank of England, being payments of deposits or loans by the Bank; and that the amount of notes in the hands of the public has not been affected by the legislation of 1844. In practice, whenever there are signs of a foreign drain, and the reserve of the Bank is diminishing, the Bank counteracts the tendency to a drain by raising the rate of discount and restricting its loans; the purchasing power of the public is thereby limited, and prices kept down; and, at the same time, gold is attracted to this country for investment. The circulation is in reality not interfered with. It was also intended by the Act of 1844 to add to the security of bank-notes by insuring a supply of gold to meet the payment of them at all times. But the solvency of the Bank of England is undoubted; and its notes would at any time be taken as gold. This intended effect of the Act of 1844, and the supplementary Act of 1845, has in the case of the notes of other banks been hitherto inappreciable.

In the *issue* department of the Bank of England, the sole business is to give out notes to the public. Before the separation of the departments, the government was due to the bank £11,015,100. This sum was declared to be a debt due to the issue department, and for the issues of notes to that amount, no gold requires to be held by it. This was just the same thing as if the Bank had originally lent £11,015,100 of its notes to government, and these notes had found their way into circulation. The Bank was also allowed to issue additional notes on securities—that is, to lend them to a limit which in September 1887 amounted to £5,184,900, and this without holding gold. The amount of notes which may thus be issued, without gold being in reserve against it, is £16,200,000. All notes issued above that amount can be issued only in exchange for gold. At the passing of the Act in 1844, the limit of notes to be issued against the government debt and securities was fixed at £14,000,000—past experience having shown that there was no risk of there being at any time less than that amount of Bank of England notes in the hands of the public. The addition of the £1,750,000 is an extra issue, authorised by the act, in consequence of certain issuing banks having since ceased to issue. The Bank has to account to government for the net profit of this extra issue of notes, and the profit the Bank derives from its issue department is the interest received on the £14,000,000 of government debt and securities, which, at 3 per cent., is £420,000 yearly. But out of this the Bank pays to government, for its banking privileges, and in lieu of stamp-duties, £180,000. If we assume the expense of the issue department to be £160,000, the net profit upon it would be £80,000. The Bank also makes a profit upon gold bullion and foreign coin, averaging £15,000 a year. These are brought to the Bank for notes; they are worth £3, 17s. 10½d. per ounce; but the Bank is obliged by its charter to purchase them at £3, 17s. 9d. The holders prefer taking this price to having their gold coined, free of charge, at the public mint, as the delay in the coining is equal to a loss of interest of 1½d. per ounce. The amount of notes in the hands of the public averages about £25,000,000; but the amount issued by the *issue* department is greater. The difference is the

amount lying in the *banking* department, and represents the reserve of gold of that department; that is to say, the banking department retains only about three-fourths of a million of coin, and transfers the bulk of its reserve to the issue department, in exchange for notes. We therefore require to regard the reserve of the banking department as gold, though lying in the shape of notes issued by the other department.

Viewed in its *banking* department, the Bank differs from other banks in having the management of the public debt, and paying the dividends on it; in holding the deposits belonging to government, and in making advances to it when necessary; in aiding in the collection of the public revenue, and in being the bank of other banks. For the management of the public debt, the Bank receives about £247,000 a year, against which there has to be set £124,000 of charges. The remaining profits of the Bank are derived from its use of its deposits, on which it allows no interest, and of its own capital. The capital was originally £1,200,000; in 1816 it reached £14,553,000—the present amount. There is besides a rest of about £3,200,000. Public deposits vary from £3,500,000 to £20,000,000; private deposits from £20,000,000 to £30,000,000. In January 1887 the public deposits were £4,189,856; the private, £23,717,053.

In 1797 the Bank found itself likely to be obliged to suspend payments, and its notes were declared by law a legal tender, although no longer convertible into coin. This state of matters continued till 1821. The notes during this interval not having been convertible into coin on demand, there was no check upon the Bank in the amount of its issues; and the currency became depreciated—that is, a £5 note would not exchange for five sovereigns; and every man to whom £5 was due, was thus obliged to accept payment in a £5 note, not worth £5. It is, however, said that the value of gold at the time was enhanced owing to absorption by hoarding and by military chests, and that the depreciation was more apparent than real. The export of gold following on a rise of prices occasioned by an issue of bank or government notes is unlimited, except by exhaustion, if these notes are not payable in coin on demand, and are issued without any check from without or self-imposed. But as prices estimated in these notes rise, the price of bullion, like other commodities, rises too, and the price of coin which can be converted into bullion, or be used abroad at its previous purchasing power, rises also. Since 1821 the Bank has been often more than once on the verge of a suspension of payments, owing to foreign drains of gold. The separation of the Bank into two departments is regarded by many as having a tendency to produce a suspension in times of panic, when the reserve is reduced by withdrawals to supply a foreign drain, or to meet an internal run. Before the separation, the Bank, in the case of withdrawals of gold, had the whole amount of gold within the Bank to meet them; but now it loses the command of all the gold in the issue department. It cannot get that gold unless in exchange for notes, but, its reserve being reduced or exhausted, it has none to spare. The restriction of credit consequent upon the approach to an exhaustion of the reserve of the banking department, is so great, that the fear of it occasions a panic. In 1847, 1857, and 1866, on the possible suspension of payments by the banking department, owing to a reduction of its reserve, being, apparent, the government of the day took the responsibility of authorising the Bank to lend additional notes, not represented by gold. This was an indirect way of giving borrowers the use of the gold in the issue department. In 1857 it was found necessary to take the benefit of this authorisation.

The Bank of England is situated in the centre of

London; but it has a branch in the west end, and nine branches in the provinces.

Joint-stock Banks in England and Wales.—In 1887 there were 118 of these banks, of which 42 in the provinces were entitled to issue notes to the amount of £2,114,513 without its being compulsory to hold any gold against them. But as they are prohibited from exceeding their authorised issue, the amount of notes actually in the hands of the public is always somewhat less. The deposits of the 11 joint-stock banks in London which may be considered London banks, and excluding the National Provincial Bank of England, and other provincial and Scottish banks, which, although they carry on business in London, have the great bulk of their business elsewhere, amount to about £105,000,000, and the acceptances granted by them to about £12,000,000. Their paid-up capital is £13,005,000. Under the Companies Acts, 1879 and 1880, most of the principal joint-stock banks have become limited liability companies. They usually allow interest upon money deposited to remain for some time.

Private Banks in England and Wales.—Of these there were 248, of which 77 were in London. Of the provincial banks 96 had an authorised issue of £3,398,608.

Banks in Scotland.—The earliest banking institution in North Britain was the Bank of Scotland, instituted by an Act of the Scots parliament in 1695. The original capital was £1,200,000 Scots, or £100,000 sterling. In 1774 the amount of stock was extended to £200,000 sterling; now it is £1,875,000, of which £1,250,000 is paid up. In 1727 a new and similar establishment was constituted by royal charter under the title of the Royal Bank of Scotland, whose advanced capital is now £2,000,000. In 1746 another association was formed, and incorporated by royal charter, with the title of the British Linen Company. From £100,000, its capital has increased to £1,000,000. Besides those three banks, there are in Scotland other seven joint-stock banking companies, with capitals varying from £1,000,000 to £150,000. There are now no private banks. The amount of deposits is over £80,000,000, on which interest is allowed. Their authorised issue of notes is £2,676,350, but their actual issue is more than double that amount. The Western Bank, with a capital of £1,500,000, a circulation of above £400,000, having 1300 shareholders, and about 100 branches, suspended payments in 1857, owing to reckless management. The shareholders, however, being under unlimited liability (see COMPANY), neither the depositors nor the note-holders sustained any loss. In October 1878 the City of Glasgow Bank, with 133 branches, suddenly suspended payments; the liabilities amounting to £12,400,000, and the estimated assets, £6,300,000, leaving a probable deficiency of £6,100,000, including the capital. It was found that for three years before the stoppage, the states of the bank's affairs, issued annually to the shareholders, had been falsified, and that advances had been made to four firms against utterly inadequate securities, to the enormous sum of nearly £6,000,000. The directors and the manager were tried for and convicted of uttering false balance-sheets, and sentenced to imprisonment. It was arranged to wind up the bank by liquidation; and though the calls made upon the shareholders involved large numbers of them in utter ruin, in four years the liquidation was complete, after a payment of £13,644,856. The Caledonian Bank temporarily suspended payments. In 1882 the five non-chartered Scottish banks, and the two whose charters involved limited liability, became limited liability companies.

In consequence of allowing interest on deposits,

the banks in Scotland may be said to hold the whole capital of the country, minus only the money passing from hand to hand. This system of depositing is aided by branches from the parent banks, and these branches are found in every small town. The entire number of branch-banks in Scotland in 1887 was 945. At these branch-banks, the agent discounts bills within certain limits, issues letters of credit, and pays out notes, and also gives cash on demand for them; though, strictly, the notes of a bank are only payable on demand at the head-office. By a strict system of supervision, Scottish branch-banks are usually well conducted, and are of great service in every department of trade. Forgeries of Scottish bank-notes are now very unusual.

The banks in Scotland, like those in Ireland, but unlike the provincial banks in England, are allowed to issue notes beyond their fixed issues, on holding gold equal in amount to the extra issue. But the gold thus retained is, like the other gold in reserve, liable for the deposits and general liabilities, as well as for the note circulation. Thus the security of the notes is increased only in a small degree by this arrangement, which, apart from the loss of profit to the bank on the gold unemployed, is attended with inconvenience at those seasons when the circulation is extended, as gold has then to be brought from London for the temporary purpose of covering the extension of issues. In Scotland, and Ireland also, banks can issue one-pound notes; the English banks are not permitted to circulate notes of less value than £5.

Besides employing money in discounting bills, the Scottish banks grant loans of fluctuating amount, called *cash accounts* or *cash-credits*. By this system an individual is entitled to draw out sums as required, to a stipulated amount, and by an implied condition to make deposits at his convenience towards the liquidation of the same. On entering into this arrangement, he finds security to the bank that he will repay to the bank, whenever called on, the balance of sums drawn out, less those paid in, with the interest that may be due. These accounts are balanced yearly like current or deposit accounts. The only difference between the latter and a cash-account on the face of them is, that if the credit allowed on the cash-account is being made use of, the balance is in favour of the bank; whereas, on the other kind of accounts, the balance is in favour of the bank's customer.

Banks in Ireland.—There are nine joint-stock banks, having 454 branches and sub-branches. Their authorised issue is £6,354,494; of which £3,738,428 is that of the Bank of Ireland. It is a national bank, lending £2,630,769 of its capital to government. It was established in 1783, with privileges resembling those of the Bank of England. Its capital is £3,000,000 Irish currency, or £2,769,230, 15s. 5d. sterling, and its rest £1,034,000. The capitals of the other banks vary from £112,766 to £1,500,000, and the total capital of the joint-stock banks in Ireland is £6,901,996. Six are banks of issue. The amount of deposits in the joint-stock banks in Ireland in 1886 was £33,301,392. All the joint-stock banks are limited companies. Interest is allowed on money deposited for a stated period, but not on money at call, or as a rule on current accounts. There are also three private banking firms in Dublin.

Savings-banks are the subject of a separate article.

Foreign and Colonial Banks.—There are on the continent of Europe public or national banks, joint-stock and private banks. The national banks are, more or less, government establishments, managing the public debts and finances, and, unlike the Bank of England, subject to government influence and interference. The Bank of France was estab-

lished in 1803 under Napoleon, by the amalgamation of three local firms. It is directed jointly by representatives of the state and of the proprietors; and has a capital of £7,223,958, public liabilities to the extent of £145,000,000 (of which about £112,000,000 are notes), and 94 branches, with 112 subsidiary offices. Its discounts are enormous in number, but small in average amount. The Imperial Bank of Germany (*Reichsbank*) resembles the Bank of France in constitution, and was established in 1875 as a reorganisation of the Bank of Berlin. Its capital is £6,000,000, with a reserve fund of £1,067,800; its other liabilities amount to about £55,000,000 (of which £35,000,000 are notes); and it has 210 branches. There are many other issuing banks throughout the empire.

There are 60 foreign and colonial banks in London, of which 34 are British companies. Besides these, 132 are represented by London bankers. In India and the British colonies there are joint-stock banks and private banks. In Australasia especially, banking has assumed large and solid proportions.

United States.—In the United States the functions of the banker are essentially the same as in Great Britain, and the many experiments that have been made in banking since the settlement of the country afford an interesting study for the financier. As early as 1652, in the colony of Massachusetts Bay, the subject of the establishment of a bank was discussed, and 34 years later (1686) permission was given to a company to issue bills of credit on the security of real and personal estate. About 1712 an institution known as the Land Bank came into existence in the same colony, and in spite of the fierce opposition of governors and councils it prospered for many years. Several other banking schemes were projected in the different colonies, but in general they appear to have met with little success. At length the breaking out of the revolutionary war led to the establishment, by recommendation of congress, of the 'Bank of North America,' which was chartered by several of the states simultaneously, and which, though a state institution, rendered the general government efficient assistance during the war.

In 1791, at the instance of Alexander Hamilton, congress established the first 'United States Bank,' with branches in several states, its capital being fixed at \$10,000,000, one-fifth of which belonged to the government. From the outset this scheme met with much opposition, particularly from Mr Jefferson and his political adherents, and at the expiration of the twenty years for which the charter was granted, congress refused to renew it, and the institution went out of existence. Five years later (1816) a second United States Bank was chartered with a capital of \$35,000,000. This bank was the depository of the government funds until the accession of General Jackson to the presidency, when they were arbitrarily removed, and an act of congress re-chartering the institution vetoed by the president.

Meanwhile, numerous state banks had sprung up, but their issues as a circulating medium were at times subject to a heavy discount as compared with gold; and the high rates of exchange between the various sections of the Union, though affording a profit to dealers in funds, were a source of great annoyance in mercantile transactions. Various attempts were made to obviate these inconveniences, such as the establishment of a bank of redemption in Boston, which was expected to receive deposits of the issues of distant banks in exchange for its own notes; the establishment of a safety-fund system in some of the states (a virtual insurance against loss by the holders of the issues of the banks doing business under the laws of the

respective states); and finally the free banking system, under which speculation ran riot, and financial disasters followed each other with alarming frequency. In the panic of 1857 occurred an almost universal suspension of specie payments.

The occurrence of the civil war (1861-65) necessitated, in the opinion of the secretary of the treasury (Mr Chase), the creation of a national banking system; and although his suggestion met with some opposition from the state banks, an act was finally passed authorising the issue of \$300,000,000 in bank-notes (afterwards increased to \$354,000,000) based on United States interest-bearing bonds, to be purchased by the banking institutions, and held by the government as security for the redemption of the funds furnished to the former for circulation. On the outset new associations were for the most part organised to conduct this business, but subsequently nearly all of the old state banks reorganised under the national system, and the result has been to furnish a stable currency of uniform value throughout the Union.

See Lawson, *History of Banking* (1855); Gilbert, *History and Principles of Banking* (2 vols. 1881); Hutchison, *The Practice of Banking* (3 vols. 1880-1887); Palgrave, *Notes on Banking* (1873); Agar, *Questions on Banking* (1886); Kerr, *History of Banking in Scotland* (1884); Rae, *The Country Banker* (1855).

Bank-notes. MANUFACTURE OF. The chief thing to attend to in the manufacture of bank-notes is the rendering of their forgery impossible, or at least easy of detection. This is sought to be effected by peculiarity of paper, design, and printing. Bank of England notes are printed in one of the blackest and most indelible of inks on paper expressly made for the purpose by one firm only. It is a hand-made paper, remarkable for its strength, lightness, and difficulty of imitation. Its peculiar water-mark constitutes one of the chief safeguards of the notes against forgery. No Bank of England notes are issued twice, so that this mark is rarely indistinct, and the paper does not lose its peculiar crispness. Some years ago a self-registering machine was invented for impressing on each note a distinctive mark known only to the bank authorities. Owing to some of the notes of the Scotch banks printed simply in black ink having been successfully forged by photography, those issued by them have since 1858 been printed in coloured inks, at least two colours being used for each note. In order still further to lessen the risk of forgery, a new kind of note was in 1885 issued by the Bank of Scotland, printed in brown, yellow, and blue. The paper is of a similar kind to that used for the Bank of England notes, with an elaborate and easily recognised water-mark. In 1887 the Commercial Bank of Scotland also issued a note of new design, printed in yellow and blue on the face, and with a dark brown device on the back. Foreign bank-notes are also printed in coloured inks. The actual cost of one-pound notes is as nearly as may be one penny each, and of larger notes only a fraction more.

Between 1837 and 1855 the plan of Perkins and Heath for reproducing an engraved steel plate by the use of the mill and die continued in use in the Bank of England. The pattern is engraved on a soft steel plate, which is then hardened, to transfer the pattern by pressure to a soft steel roller, on which, of course, the pattern is produced in relief; the roller or mill is then hardened, to reproduce the pattern in the plate from which the printing is to be done; and thus almost any number of plates for all common purposes can easily be produced.

In 1855 electrotype-printing was introduced by

Mr Smee, with the assistance of the mechanical officials (see ELECTROTYPING); and since that time, the notes of the Bank of England have been all produced by surface-printing from the electrotype.

The number of notes produced and issued by this bank sometimes amounts to 300,000 per week. There are seventy or eighty kinds of Bank of England notes, differing in their denominations or values, but similar in the mode of printing. Zinco-graphy and lithography are employed by some banks for the printing of their notes; and also *acirage*, a mode of hardening copper electrotypes with a thin surface of steel.

In the United States, the bank-notes at present in circulation are manufactured by the government bureau of engraving and printing, the paper being made by a private concern under a patented process, the chief ingredients being a mixture of linen and cotton fibre, into which are introduced threads of silk, so arranged as to be perceptible after the notes are printed. This style of paper is furnished only to the government. Superior skill is exercised in engraving the plates, nearly all parts of them being executed by the geometrical lathe and the ruling-engine, the work of which it is impossible to imitate successfully by hand. The printing of the notes is done in coloured inks of the best quality, sometimes as many as four shades being used. The great expense of the machines used in the engraving, and the superior quality of the work generally, renders successful counterfeiting almost impossible. The notes when badly worn are returned to the United States Treasury, other notes being issued in their stead. See GREENBACKS; and for the question of a paper-currency, see CURRENCY.

Bankruptcy, or **INSOLVENCY**, is the state of a person declared to be unable to pay his debts. In England, insolvency is a term which had, till the distinction was abolished in 1861, long been confined to the case of a non-trader who was unable to pay his debts. All who were *traders* were said, in the same circumstances, to be, not insolvent, but bankrupt. Different courts, called the Bankrupt and the Insolvent Courts, were applicable respectively to these two great divisions of mankind, traders and non-traders. In the case of traders, the Court of Bankruptcy was the court to which they or their creditors applied. That court, whenever a trader was unable to pay his debts—certain tests of which inability were called acts of bankruptcy—on the application of a creditor, took forcible possession of his property or his assets of every kind, converted these into money, and distributed the proceeds impartially among the creditors, according to certain rules, at the joint expense of the creditors. In the course of doing this, the court required the bankrupt to state all the property he had, where it was, and to give explanations as to what had been lately lost; and it was a crime for him to conceal or make away with any part of his property to the prejudice of this impartial distribution. The creditors also came in and proved their debts against his estate, thereby showing their title to share in it. In this way the debtor was entirely stripped of everything (with a few trifling exceptions) which he had, and which was saleable; and, on the other hand, he received a certificate which entirely cleared him of the encumbrance of his past debts for ever—freed him not only from imprisonment, but even from the liability to pay more in future, should he afterwards become rich; and he could thus begin the world anew.

On the other hand, the non-traders, who consisted of country gentlemen, professional men, gentlemen at large, and nondescripts of every degree who were not traders, fell under the care of the Insolvent Court. These non-traders petitioned the court

voluntarily, instead of their creditors doing so, as was the case in the Bankrupt Court, and they of course put off this application till the last, when they were in prison, though they might also petition before any creditor put them in prison. The sole condition on which the Insolvent Court granted them its protection, and discharged them from prison, was, that they should not only give up all their property, but state fully all the debts and liabilities they had incurred. If they did this satisfactorily, the court relieved them from imprisonment, but did not entirely free them from the debt they had incurred. On the contrary, they were still liable for their debts; and if ever they should in future become rich enough to pay twenty billings in the pound, they were still held liable to make up that amount. This contingency, however, seldom happened, and, moreover, when it did happen, considerable leniency was shown to the debtor, so that practically, both in bankruptcy and insolvency, the debtor was discharged, and was at least saved from imprisonment. The bankruptcy laws date from the time of Henry VIII., and the insolvency laws from the time of Elizabeth, the distinction as above explained having always been kept up between them till the statute of 1861. By that statute the Insolvent Court was abolished.

Important changes were made in the practice of bankruptcy by the Act of 1869, which repealed the prior enactments and rendered the law more uniform. Under that act non-traders as well as traders might be made bankrupt; and even peers of the realm not only might be made bankrupt, but, on being declared so, were at once disqualified from sitting and voting in the House of Lords till they received their discharge. Another Act provided that a peer commits a breach of privilege if he sits or votes, or attempts to do so, while thus disqualified. And if he is a representative peer, a new election must take place when he becomes bankrupt. But a much more complete and beneficial change in bankruptcy administration was made by the Bankruptcy Act, 1883, 46 and 47 Vict. chap. 52. That act abolished the Special Court of Bankruptcy, and transferred its jurisdiction to the High Court of Justice, the Lord Chancellor selecting one of the judges to transact that class of business. The petition is presented in the High Court if the debtor resides in the London district, or if he is not resident in England, or if the creditor does not know where he resides. The London district includes all the area of the ten metropolitan county courts. The rest of England is divided into separate jurisdictions, and the judge of each county court is the ordinary judge. A large part of bankruptcy jurisdiction, however, both in the High Court and the County Courts, is exercised by the registrars, who hear the petitions, hold public examination of debtors, and even approve of compositions and grant discharges, when these are unopposed. There is an appeal from the County Courts to a Divisional Court of the High Court of Justice, in which the bankruptcy judge is sitting, and in the general case there is no further appeal (Bankruptcy Amendment Act, 1884). The ordinary right of appeal remains as regards the original jurisdiction in bankruptcy of the High Court. All bankruptcy courts have very large and useful discretionary powers in dealing with procedure. The comptroller used to keep a register of all bankruptcies, showing the facts and progress of each. He has now been transferred from the Court to the Board of Trade.

The tests of bankruptcy, or rather the acts done by a trader which make him liable to be proceeded against as a bankrupt, are technically called acts of bankruptcy. These are—departing the realm; remaining abroad; absenting himself from his

dwelling-house or keeping (himself prisoner in his) house, all with the intent of defeating or delaying his creditors; allowing his goods to be taken in execution for debt; executing a fraudulent grant, gift, or conveyance of his lands or goods; filing in court a declaration of inability to pay debt, or a simple notice that he suspends payment; or non-payment of a judgment debt after what is called a bankruptcy notice. If a trader executes a conveyance of his whole property to a trustee for the benefit of his creditors, this will be treated as an act of bankruptcy. And, after a petition has been presented, the paying or giving security to any one creditor, so that he shall receive more than the other creditors, is void and null.

The mode in which an adjudication in bankruptcy is conducted in England is as follows: The act of bankruptcy must have occurred within three months before the proceeding is commenced. The first step is a petition to the court. This may be presented by either one or several creditors. If, as is most usual, it is presented by a creditor or creditors, then such creditors must have a liquid, or duly constituted, claim of debt amounting to not less than £50 in the aggregate. If the debt is due under a mortgage or other security, the petitioning creditor must state his willingness to give up his security for the benefit of the creditors, or he must estimate its value, and the unsecured balance must amount to £50. If the petition be presented by the debtor himself, it cannot be withdrawn without leave of the court. The petition will not be entertained unless the debtor be domiciled in England, or within a year has ordinarily resided or had a dwelling-house or place of business in England; the interest of Scottish and Irish debtors being in this way protected. On the petition for adjudication of bankruptcy being presented, together with an affidavit of the debt, it is filed in court, and on proof of the particular act of bankruptcy, the court may appoint a special manager if the nature of the business requires it; otherwise the usual receiving order is pronounced, and the official receiver takes the estate until the creditors meet and determine, after the debtor's public examination and statement of affairs, whether he shall be adjudged bankrupt, or whether a scheme of arrangement or composition shall be entertained. Such a scheme must be accepted by three-fourths in value of the creditors, and will not be approved by the court unless it is reasonable and for the benefit of the general body of creditors. In the event of adjudication being resolved upon, the creditors appoint a trustee to receive and distribute the estate with the advice of a committee of inspection. The trustee gives security to the satisfaction of the Board of Trade. Even after adjudication, a composition may be accepted by special resolution, and the bankruptcy annulled. The bankrupt is bound to assist in every way in the discovery and realisation of his property, and he may be arrested if there is reason to believe that he is going to defeat these main purposes of the bankruptcy. The court may examine any one suspected of having the debtor's property, or being indebted to him, or being able to give information about the estate. They have also full discretion as to the discharge of the bankrupt, which may be absolute, or on conditions with respect to any earnings or income afterwards becoming due to the bankrupt, or after-acquired property. The discharge is not given if the bankrupt has committed any of the offences mentioned in the Act of 1883, or in the Debtors Act, 1869. The first class illustrate the severity of the new law; they are such as not keeping proper books within the three years before the bankruptcy; continuing to trade after knowledge of insolvency; contracting a debt without

any reasonable expectation of being able to pay it; bringing on bankruptcy by rash and hazardous speculations, or an extravagant manner of living; causing unnecessary expense by frivolous or vexatious defences to an action; having given, within three months before bankruptcy, an undue preference; having previously been adjudged bankrupt, &c. An undischarged bankrupt who obtains credit to the extent of £20 without mentioning his bankruptcy, may be punished for misdemeanour. Every bankrupt is disqualified for all public functions, not merely for sitting in parliament, but for election to town councils and other local boards, and for acting as a justice of the peace. The disqualification ceases if the bankruptcy is annulled, or when the bankrupt is discharged with a certificate that the bankruptcy was caused by misfortune without misconduct.

As regards the administration of the property by the trustee, the act lays down very precise rules in schedules, and the Lord Chancellor has power to make further rules. Every liability of the debtor is provable, except a demand for unliquidated damages not founded on contract or breach of trust. Where there have been mutual dealings between the debtor and a creditor, the latter proves only for the balance. A preference is given to taxes and rates, wages or salary of clerks and servants and workmen for four months up to £50, and by a statute in 1886, this preference is established in the case where an agricultural labourer has agreed to take his wages in a lump sum at the end of the year. If there is any surplus, it is first applied in payment of interest on debts. From the assets available for distribution, there is excepted property held by the bankrupt in trust, and his trade tools, and the necessary wearing apparel and bedding of himself and family, but not beyond the value of £20. Goods in the reputed ownership of the bankrupt, though belonging to another, are available for distribution; and also the pay or salary or pensions of public servants to a certain extent. On the other hand, the trustee is entitled to disclaim burdensome property or shares or contracts likely to result in loss. The trustee has full powers of sale and compromise. The first dividend should be paid within four months of the first meeting of creditors, and subsequent dividends at intervals of not more than six months. In general, the trustee is paid by commission, partly on the amount realised, and partly on the amount distributed. If one-fourth of the creditors dissent from this, the matter is adjusted by the Board of Trade. That Board also appoints the official receivers in each district, and they have opened in the Bank of England a bankruptcy estates account, into which bankruptcy money from every district in England must be paid. If the Committee of Inspection make out a special case, the Board of Trade will permit money to be paid into a local bank. The creditors have the power of removing the trustee by a simple vote.

The Bankruptcy Act, 1883, also contains important provisions as regards small bankruptcies, where the property of the debtor is not likely to exceed £300; in such cases, the official receiver becomes trustee, there is no Committee of Inspection, and the procedure is more summary. Also, where judgment has been obtained in a county court against a debtor unable to pay, but whose total indebtedness is less than £50, that court may administer his estate, and make an order for the payment of his debts by instalments. The act also provides for the administration in bankruptcy of the estate of a person dying insolvent, which formerly could be accomplished only by a suit in Chancery.

The criminal offences connected with bankruptcy

are defined by the Debtors Act, 1869, as modified by the Act of 1883, which gives all bankruptcy courts power to commit for the trial of such offences, and directs the public prosecutor to take proceedings. The most common offences are—the bankrupt's not surrendering himself to the jurisdiction of the court at the time appointed; not making a full discovery of all his property and his dealings with it; concealing or embezzling part of his property above £10; not informing his trustee of any false debt proved under his bankruptcy; falsifying his books; fraudulently accounting for his property by fictitious losses; pawning or *malà fide* disposing of property within three months before the bankruptcy; or any of the offences mentioned above as disentitling a bankrupt to discharge.

In Ireland, the code of Bankruptcy differs largely from that in England and Scotland. It consists of the Irish Bankrupt and Insolvent Act, 1857; the Debtors Act (Ireland), 1872; and the Bankruptcy (Ireland) Amendment Act, 1872. The first of these statutes contains 410 sections, and 26 schedules, which were largely modified in 1872. The general principle is that of adjudication in the Court of Bankruptcy at Dublin, the estate being taken by official assignees, who act along with an assignee afterwards appointed by the creditors. They are paid by a percentage on realisation. Prior to 1872 the law was open only to enumerated classes of traders. The procedure in insolvency at quarter sessions, provided for by the Act of 1857, has been discontinued, and now local courts in Ireland have no jurisdiction in bankruptcy, except under reference from the Central Court. Compositions may be sanctioned by three-fifths in number and value of the creditors, and under the trustee clauses of the Act of 1872, winding up by a trustee and committee of inspection was introduced. Imprisonment for debt was abolished in 1872, and new provisions introduced for the punishment of fraudulent debtors.

In Scotland, Bankruptcy, or Sequestration, now universally proceeds under the Bankruptcy (Scotland) Act, 1856, 19 and 20 Vict. chap. 79, which superseded previous general Acts of 1815 and 1839, and is substantially the same process as that which prevails in England; but there are some differences of no small importance, besides the different names given to the steps of the process. Certain acts and conduct of the bankrupt are held to be symptoms of notour bankruptcy, corresponding to what are called in England acts of bankruptcy. The first step is a petition for sequestration, which may be presented by the debtor or by creditors whose debt must be of the same amount as in England. There is no separate court of bankruptcy, but the sheriff of the county, or the Bill Chamber of the Court of Session, has jurisdiction to award sequestration, and the court then appoints a judicial factor, if necessary, until the creditors elect a trustee, in whom the property vests. The creditors also appoint commissioners to advise with the trustee as to the management of the estate. The duties of the trustee and commissioners are nearly identical with those of the trustee and committee of inspection in England. The creditors prove their debts in a similar way. There are also powers of winding up the estate under a deed of arrangement. The whole procedure in the sequestration has been very much imitated in the statute passed in England. The commissioners of the creditors fix the trustee's remuneration. The trustee examines the grounds of claim of creditors, there being an appeal to the Lord Ordinary or sheriff, and he examines the bankrupt and his family on oath, if necessary. On a report from the trustee as to the conduct of the bankrupt, which is not demandable by the bankrupt till five

months after the sequestration, the bankrupt petitions for his discharge, and when the creditors all concur, he is entitled to his discharge at once if he has paid 5s. in the £1; at later dates, if he has the concurrence of a certain number of his creditors, he is also entitled to a discharge; but if the creditors oppose, the court has a discretionary power to grant or suspend the discharge with or without conditions. But in no case will a discharge be given in a case where there has been fraudulent concealment of effects, or where less than 5s. in the £1 has been paid, unless it is proved that the failure to do so arose from circumstances for which the bankrupt is not responsible. In Scotland, there is no distinction, as there was once for many purposes in England, between traders and non-traders. Another peculiarity of a sequestration is, that the process is applicable not only in the case of debtors who are alive, but in cases of persons who have died in insolvent circumstances. In Scotland, there is a process called *cessio bonorum*, the application of which has been very much extended by the recent statutes of 1880 and 1881, abolishing imprisonment for debt, and giving creditors the right to institute proceedings; and where the debtor has trifling assets, it is in the power of the creditors to resolve that their debtor shall not have a discharge under the sequestration, but only a decree in a *Cessio Bonorum* (q.v.).

By the Bankruptcy Frauds and Disabilities Act, 1884, the law of Scotland was assimilated to that of England in certain important respects. The same disqualifications of bankrupts for parliamentary and municipal office are introduced; and it is declared an offence for an undischarged bankrupt to obtain credit for £20 or more.

With regard to the effect of a bankruptcy in either of the three kingdoms, the rule is, that whether the bankruptcy is awarded in England, Ireland, or Scotland, all the property of the bankrupt vests in the assignee or trustee, wherever it is situated; and when the bankrupt is discharged, the discharge is thereafter complete and given effect to in all parts of the United Kingdom. For some time after the passing of the Act of 1856, owing to the belief that it was much easier to be made a bankrupt, and obtain a discharge from debt, in Scotland than in England, various English debtors resorted to Scotland for forty days, in order that they might be made bankrupt, no doubt thinking that creditors would be less likely to oppose their discharge at that distance; and after their discharge, they returned to England, and pleaded this Scotch bankruptcy. But a recent statute has given power to the Scotch courts to recall such sequestrations, where, from the situation of the assets and the residence of the majority of the creditors, it appears that the distribution ought to take place in England or Ireland. By an Act of 1875, clerks, shopmen, and servants employed by a bankrupt have a preference for four months' wages, and workmen for two months' wages. There is in Scotland an Accountant in Bankruptcy, to whom trustees render accounts, and whose report is accepted by the court as conclusive on a variety of matters. The Accountant makes a general report to the Court of Session every year on all sequestrations, but this is not published or laid before parliament.

In the United States, the several states have power to legislate on the subject of bankrupt and insolvent laws, subject to the authority conferred upon congress by the constitution to adopt a uniform system of bankruptcy, which authority, when exercised, is paramount. Such state laws, discharging the person or property of the debtor, cannot constitutionally be made to apply to contracts entered into before they were passed; and

they apply only to contracts made within the state between citizens of that state. The power of congress in this matter has been exercised by a series of statutes, the latest of which is dated 1878, and which deals with the general doctrines of voluntary and involuntary bankruptcy, offences against bankrupt law, and the constitution of bankruptcy courts. It is unnecessary to describe the varieties of practical detail in the administration of the various states.

For England, see Robson, *On the Law of Bankruptcy* (6th ed 1887); for Scotland, Bell's *Commentaries*, and Goudy, *On the Law of Bankruptcy in Scotland* (1886).

Banks, SIR JOSEPH, a zealous naturalist, was born in London, 13th February 1744, and was educated at Harrow, Eton, and Christ Church, Oxford. A student of botany from his fifteenth year, in 1766 he made a voyage to Newfoundland, collecting plants; and from 1768 to 1771 he accompanied Cook's expedition round the world in a vessel equipped at his own expense. In 1772 he visited the Hebrides and Iceland, whence he brought back a rich treasure of specimens for his studies in natural history. Before this voyage, Staffa was hardly known beyond its immediate vicinity. It was carefully examined by Banks, and through him its wonders were made known to the public. In 1778 he was elected President of the Royal Society, an office which he held for 41 years; in 1781 he was created a baronet, and in 1802 a member of the French Institute. He died at Spring Grove, Isleworth, 19th June 1820. Banks deserves particular credit for founding and managing the African Association; and the colony of Botany Bay owed its origin mainly to him. Through his efforts, the bread-fruit tree was transferred from Tahiti to the West Indies, and the mango from Bengal, as well as many of the fruits of Ceylon and Persia. Many naturalists and travellers—Blumenthal, Horne-mann, Burchardt, Mungo Park, and others—were indebted to him for zealous and disinterested assistance. During the French war, Banks did much to alleviate the sufferings of all captive men of science; and Cuvier, in his *elogue* on him, states that no less than ten times had collections, captured by the English, been restored to France through Sir Joseph's instrumentality. Some articles excepted, Banks wrote nothing but *A Short Account of Blight, Mildew, and Rust* (1805), and *Circumstances relative to Merino Sheep* (1809). He left a valuable library, catalogued by his friend Dryander (5 vols. 1806-5), and a rich collection of specimens in natural history, both of which he bequeathed to the British Museum.

Banks, NATHANIEL PRENTISS, American politician and soldier, was born in Massachusetts, 30th January 1816. At first a factory-worker, he studied law, and became successively a member of the state and the national legislatures. He was Speaker of congress in 1856, and in 1857, 1859, and 1861 was elected governor of his native state. On the outbreak of the war, he took a command in the army, at first on the Potomac, then at New Orleans, and finally on the Red River. Relieved of his command in 1864, he re-entered congress, voting mainly with the Republican party.

Banks, THOMAS, sculptor, born in Lambeth in 1735, for seven years was apprenticed to an ornament carver, and in 1763 gained a medal for a bas-relief from the Society of Arts, in 1770 the gold medal of the Royal Academy. In 1772-79, having married a well-to-do wife, he resided in Rome. He gained much fame but little profit, and on his return to London, his refined imaginative style was little appreciated in comparison with the inferior performances of some of his contemporaries. In 1781 he repaired to Russia, where he was well received

by the Empress Catharine, who purchased his 'Cupid,' and gave him a commission for a group called 'Armed Neutrality.' Next year he returned to England, where, in 1784, he exhibited perhaps his finest work, 'Achilles Enraged,' now in the entrance hall at Burlington House. In 1785 he was elected a member of the Royal Academy. The monuments of Sir Eyre Coote in Westminster Abbey, and of Captains Burgess and Westcott in St Paul's Cathedral, were among his works. He died February 2, 1805. It was in purely imaginative works that Banks most excelled; in practical subjects, his introduction of the ideal was incongruous and inartistic.

Banks, in Navigation, are shelving elevations in the sea or the bed of a river, rising to or near the surface, composed of sand, mud, or gravel. When tolerably smooth at the top, they constitute *shallows*, *shoals*, and *flats*; but when rocky, they become *reefs*, *ridges*, *keys*, &c. A good chart always defines them, indicating whether they are sands or rocky. Some sandbanks shift their position by reason of currents, &c., and are specially troublesome.

Banks, SAVINGS. See SAVINGS-BANKS.

Banksia, a genus of the Australian order Proteaceæ (q.v.), named in honour of Sir Joseph Banks. Most of the species are shrubs, but a few become small trees. They have hard dry leaves, generally white or very pale green beneath, and present a remarkable appearance from the peculiar arrangement of their branches, which bear towards their extremities oblong heads of very numerous



Banksia :

A, shoot; B, single flower enlarged; C, in section.

flowers. The flowers secrete much honey. Some of the species are now frequent ornaments of green-houses in Britain. They are abundant in all parts of Australia, forming, indeed, a characteristic feature of its vegetation, and are called Honey suckle trees. *B. grandis*, found at Swan River, exceeds all the rest of the genus in size, being said occasionally to attain a height of 50 feet.

Banks Land, an island in the west of Arctic America, discovered by Parry in 1819, explored by Macure in 1850, and named by him Baring Island. It is separated by Banks Strait from Melville Island, lying to the north-west, and by Prince of Wales Strait from Prince Albert Land, lying eastward.

Bankura, a town, capital of a district in Bengal, on the north bank of Dhakisor River. It is a healthy place, with a trade in rice, oil-seeds, cotton, and silk. Pop. 17,000.—The district, in Bardwan division, Bengal, has an area of 2621

sq. m.; pop. (1881) 1,041,752, over 90 per cent. of whom are Hindus.

Bann, two rivers in the north-east of Ireland—the Upper Bann, flowing into, and the Lower Bann, out of Lough Neagh. The Upper Bann rises in the Mourne Mountains, and runs 25 miles NNW. through the counties of Down and Armagh. The Lower Bann, strictly the continuation of the Upper, issues from the north-west corner of Lough Neagh, and flows 40 miles NNW., through Lough Beg, dividing the counties of Antrim and Londonderry. It runs past Coleraine, into the Atlantic Ocean, 4 miles SW. of Portrush. It has important salmon and eel fisheries. Vessels of 200 tons can reach Coleraine by the river, 4 miles from the ocean.

Bannatyne Club, a literary club deriving its name from George Bannatyne (1545–1608), a native of Forfarshire, and Burgess of Edinburgh, to whose manuscript, compiled during the pestilence of 1568, we are indebted for the preservation of much of the Scottish poetry of the 15th and 16th centuries. The Bannatyne Club was instituted in Edinburgh in 1823 by Sir Walter Scott, with the assistance chiefly of David Laing of the Signet Library, Archibald Constable, and Thomas Thomson. Its object was to print rare works illustrative of Scottish history, topography, poetry, miscellaneous literature, &c., in a uniform and handsome manner, either at the expense of the club, or as the contributions of individual members. The club originally consisted of 31 members only, who paid an annual contribution of five guineas; but, owing to the anxiety of many eminent men to become members, the number was gradually extended to 100. Its first president was Sir Walter Scott, who was succeeded by Thomas Thomson, and Lords Cockburn and Rutherford; and its first secretary was David Laing, who continued to its close to discharge the duties of the office. The club had annual meetings in December, which seem to have been of a very convivial character. The club was dissolved in 1861. Since its commencement it numbered among its members many of the most distinguished Scotsmen, and printed 116 works, some valuable as they are rare, and all fetching high prices at sales. A complete set was sold in 1887 for £235.

Banner, a term sometimes loosely used to signify any military ensign or standard (see STANDARD), but in a more strict sense denoting a square flag charged with the coat of arms of the owner. The banner was borne by sovereigns, princes, barons, and bannerets, and served as the ensign both of the owner of it and of his retainers and followers. It differed from the pennon not only in being square and not pointed, but in bearing only the owner's arms, and not his badge or device; and therefore the pennon of a newly made Banneret (q.v.), though intended to represent a banner, was not exactly one. The royal standard of the United Kingdom, and the cavalry standards in use in the army, are in strictness banners. See FLAG, PENNON.

Banneret, a higher grade of knighthood conferred by the sovereign for some heroic act performed in the field, and so called because the pennon of the knight was then exchanged for the banner—a proceeding which was effected by the sovereign on the field of battle standing beneath his own royal standard displayed, and tearing off the points of the pennon so as to give it the requisite square shape of the banner. The Roll of Caerlaverock contains an enumeration of 87 bannerets, including the king himself, 11 earls, and the Bishop of Durham, as present in the campaign of Edward I. in Scotland in 1300. During the reign

of Elizabeth, the degree of banneret was allowed to die out in England; but it was revived in 1642, when Colonel John Smith, who recovered the royal standard at Edgehill, had that dignity conferred on him by Charles I. Sir John Smith was properly the last knight-banneret made in England; for, though George III. bestowed the title on Sir William Erskine in 1764, and on five naval officers in 1773, the proceeding was considered irregular, as the ceremony was performed at a review, and not in actual warfare; and the rank of the recipients of the honour was therefore not generally recognised.

As occupying a rank intermediate between barons and ordinary knights, bannerets have sometimes by an etymological misapprehension been styled 'baroneti' instead of 'bannereti.'

Bannock, a cake of home-made bread, common in Scotland and the north of England. It is usually composed of pease-meal or of pease and barley meal mixed; prepared without any leaven, it is baked on a circular plate of iron, called a girdle. When made of mixed meal, it is often called a *maslum bannock*. 'Bannocks of barley-meal' form the theme of a popular Scottish song. The word bannock is from the Gaelic *bannach*, 'a cake.'

Bannockburn, a Stirlingshire village of 2550 inhabitants, 3 miles SSE. of Stirling, on the Bannock Burn, a little affluent of the Forth. It is an important seat of the woollen manufactures, especially of carpets and tartans. Tanning is carried on to some extent, and the neighbouring villages are noted for the manufacture of nails; whilst coal abounds in the vicinity. In the great battle of Bannockburn, fought on Monday, 24th June 1314, Robert Bruce, with 30,000 Scotch, gained a signal victory over Edward II., with 100,000 English and secured his throne and the independence of Scotland. The English are said to have lost 30,000, and the Scotch 8000 men. The 'Bore Stone,' on which Bruce is said to have fixed his standard on that eventful day, is still to be seen on an eminence; and near it is a flagstaff, 120 feet high, erected in 1870. Not far off was fought the battle of Sauchieburn (q.v.). See R. White's *Battle of Bannockburn* (Edin. 1871).

Banns, or BANS, OF MARRIAGE. This is one of three alternative preliminary forms now essential to the legal celebration of marriage in England, the other two being episcopal license and a registrar's certificate. Banns of marriage, like many of our ecclesiastical regulations, have their origin in the ancient practice of the Roman Catholic Church, which our reformers wisely refrained from abolishing. By the publication of these banns is meant the legal proclamation or notification within the parish, district, or chapelry, and in the proper church or chapel, of the names and descriptions of the persons who intend to be there married; the object being that all who have objections to the marriage may be enabled to state them in time. If the bridegroom live in a different parish from the bride, the banns must be proclaimed also in that parish, and a certificate of such proclamation must be produced before the celebration of the marriage. According to the old English canon law, the publication of banns might be made on *holidays*; but a change was made to *Sundays* by Lord Hardwicke's Marriage Act in 1753, and although that act was afterwards superseded by the 1 Geo. IV. chap. 76, the regulation as to Sundays has been since continued. Seven days' notice at least must be given to the clergyman before publication of banns. Banns are to be published in an audible manner, according to the rubric prefixed to the marriage-service in the *Book of Common Prayer*, upon three Sundays preceding the ceremony, during the time of morning-service, or of evening-service (if on the day of

publication there shall be no morning-service) immediately after the second lesson. Marriages celebrated without publication of banns, or license, or a registrar's certificate, are null and void. By the Marriage Act of 1836, the bishop may license chapels for the celebration of marriages in populous places; and by 1 Vict. chap. 22, banns may be published in such chapels. If the marriage be not celebrated within three months after publication of banns, the marriage shall not take place until the banns shall have been republished on three several Sundays, unless it be a marriage by license, or now, by certificate, which two latter alternatives, however, must also be availed of within the three months.

The purpose of the law is to secure public knowledge of intended marriages, and therefore it is not necessary that such publication should be made in the real baptismal names of both or either of the parties; it is sufficient that the banns be published in the names by which the parties are *known*, or either of them. But if either of the names used be false, to the knowledge of *both* parties, the marriage is void. As the publication of banns invites people to object, if the parent or guardian express dissent, it is the duty of the clergyman, when such objections are offered, to proceed no further; and if he marry a minor, notwithstanding such dissent, he will be liable to severe penalties by the ecclesiastical law, though he will not be liable to an indictment. Again, on the other hand, if a clergyman of the Church of England refuse, without cause, to perform the marriage, he is liable to an action.

In Scotland, Fraser shows that banns were first sanctioned by councils which were held in that country long before the time of the Council of Trent. After the Reformation in Scotland, the practice of proclaiming banns was continued. In 1712 the privilege of publicly celebrating marriage was extended to the Scotch *Episcopalian* clergy, and in 1834 to those of other dissenting bodies. When both of the parties have their *Domicile* (q.v.) within Scotland, and enter into marriage in England or Ireland, they must have their banns proclaimed in the parish of their domicile in Scotland, otherwise they are liable to the penalties of clandestine marriage. By the Marriage Notice Act, 1878, a certificate of publication of notice of marriage may be issued by a registrar to persons resident for fifteen days in the district; the fee for registry is 1s. 6d.

The Scotch law differs from the English in regard to the effect of non-publication of banns. In England, in some cases, the consequence is to render the marriage absolutely void. In Scotland, however, marriage, without proclamation of banns, is valid; but in such case the parties, celebrator, and witnesses, are liable in special penalties. See MARRIAGE: SPECIAL LICENSE: REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES.

In the United States, banns of marriage are not required in most states, having been gradually superseded by the marriage license; in some states even this is not required. Each state has entire jurisdiction over its own citizens on the subject of marriage.

Banquette, in Fortification, is a raised ledge or step inside the parapet of a rampart, of such a height that musketeers, when standing on it, may be able to fire over the crest of the parapet without too much exposure to the enemy.

Banshee, in the folklore of the Irish and Western Highlanders of Scotland, a female fairy who makes herself known by wailings and shrieks, before a death in the family over which she exercises a kind of guardianship. This notion is woven

into many folk-tales of rare pathos and beauty. A guardian spirit of the same kind occurs frequently in the folklore of Brittany. The name is supposed to be a phonetic spelling of the Irish *bean sútha*, old Irish *ben síde*, 'woman of the fairies.'

Banswara, a state in the south-west of Rajputana. The surface is hilly, with much timber; it has an area of 1500 sq. m., and is peopled by wild and turbulent Bheels. This state was fearfully oppressed by the Mahrattas, till, in 1818, it passed voluntarily into British protection. Pop. (1881) 104,000. —The capital, also called Banswara, lies 8 miles W. of the Mahi River. Pop. about 6000.

Bantam, a seaport, now decayed, about 61 miles W. of Batavia, in a residency of the same name, which forms the west end of Java. It occupies an unhealthy situation, on a low swampy beach. It was the first Dutch establishment in Java (1595), and the seat of government of the residency, until transferred to the more salubrious Serang, 6 miles distant, in 1816. The harbour is now much obstructed by coral-reefs and other deposits, and the trade has gone to Batavia. Pop. of residency, 760,000.

Bantam Fowl (*Gallus bankiva*), a well-known variety of the common Domestic Fowl, originally brought from the East Indies, and supposed to derive its name from Bantam, in Java, though they probably came from Japan. It is remarkable for small size, being only about a pound in weight, and for a disposition more courageous and pugnacious than even that of a game-cock. A bantam-cock will drive to a respectful distance great dung-hill-cocks five times its weight, and has been described as 'a beautiful example of a great soul in a little body.' There are several sub-varieties of the bantam. Most of them have the legs much feathered. The flesh and eggs are good, although the eggs are of course small. The bantam hen lays well in winter. See POULTRY.

Banteng (*Bos sondaicus*), a species of ox, a native of Java and Borneo, which, in colour, shape, horns, and absence of dewlap, bears some resemblance to the Gaur (q.v.) (*Bos gaurus*) of India. The banteng is black, with white legs; the hair is short and sleek; the limbs slender; the muzzle sharp; the back rises into a high arch immediately behind the neck. It inhabits forests, and has been generally described as untamable.

Banting System. See OBESITY.

Bantry, a seaport town in the south-west of County Cork, Ireland, in a cove opposite Whiddy Isle, at the head of Bantry Bay, and 44 miles WSW. of Cork. The chief trade is the export of agricultural produce. A little fishing is carried on. In last century there was an extensive pilchard-fishery here; but the pilchard has now deserted the coast. Many tourists resort to Bantry in summer. Pop. (1871) 2830; (1881) 2632.

Bantry Bay, a deep inlet in the south-western extremity of Ireland, in County Cork. It is 2½ miles long, running ENE., with a breadth of 4 to 6 miles. It is one of the finest harbours in Europe, affording safe and commodious anchorage for ships of all sizes. Here a French force attempted to land in 1796. The coast around is rocky and high.

Bantu ('people'), a native word applied by Friedrich Müller as an ethnographical name to a large group of African languages, and to the peoples speaking the same. The Bantu races occupy most of Africa from 20° S. lat. to 6° N. lat. northwards, and are broadly distinguished from the Negritos and Hottentots to the south, and the soudanese negroes to the north. They fall geographically into three divisions. The eastern includes Kaffirs and Zulus,

and extends to the Galla and Somali country, the Swahili being the most northerly section. The central division comprises Bechuans (Basutos, Baso long, &c.). To the western division belong the inhabitants of the west coast from the Hottentot country to the Gulf of Guinea, the peoples of Benguela, Angola, Congo, Loango. The linguistic inter-relationship of the Bantu languages, as intimate as that of the Indo-Germanic family, was first recognised by Gabelentz and Pott, and afterwards elaborated by Bleek. It rests both on roots and on grammar. Within their range are included by Lepsius all the negro languages of Central Africa. See AFRICA, KAFFIRS, ZULUS, &c. *

Banville, THÉODORE DE, a French poet and prose-writer, the son of an officer in the French navy, was born at Moulins in 1820. His first volume, *Les Caryatides*, issued in 1841, gave him a standing as a poet among the younger members of the Romantic school, and was followed by *Les Stalactites*, *Rimes Dorées*, *Trente-six Ballades Joyeuses*, *Les Exilés*, *Les Occidentales*, *Odes Funambulesques*, *Comédies*, *Esquisses Parisiennes*, *Contes pour les Femmes*, *Contes Féeriques*, *Mes Souvenirs*, *Petit Traité de Poésie Française*, and *Dans la Fournaise* (1892). He was one of the most musical and sparkling of lyrists; one of the gayest and wittiest of parodists. The title 'roi des rimes' was given him from the graceful ingenuity with which he handled the most difficult forms of verse—the ballades, rondeaux, and rondels of the mediæval writers—which he re-tored to popularity in France, and which Andrew Lang and Austin Dobson, following his example, have successfully introduced into English poetry. Banville was an eloquent but hardly a discriminating critic. He died 12th March 1891.

Banyan, or **BANIAN** (*Ficus indica*), an Indian tree, remarkable for its vast rooting branches. It is a species of Fig (q.v.); has ovate, heart-shaped entire leaves, about 5 or 6 inches long; and produces a fig of a rich scarlet colour, not larger than a cherry, growing in pairs from the axils of the leaves. The branches develop pendulous adventitious roots, which soon become new stems, the tree in this manner spreading over a great surface,



Banyan Tree.

in fact almost developing into a wood, and enduring for many ages, although the original central trunk decays. One has been described as having no fewer than 350 stems equal to large oaks, and more than 3000 smaller ones, covering a space sufficient to contain 7000 persons. The tree is inhabited by great numbers of birds, fruit-bats, and monkeys, which latter consume the leaves as well as the fruit. The seeds are often deposited by birds in the crowns of palms, and send down roots which become stems

and eventually replace the palm altogether. The wood of the banyan is light, porous, and of no value; but the tree furnishes lac and caoutchouc, and the latex and milky juice are sometimes employed in Hindu native medicine. By the Brahmuns the banyan is held in special reverence, as is its congener the Sacred Fig, also called Peepul and Bo-tree (*F. religiosa*) by the Buddhists, so that it is said that the sites of temples can be readily distinguished as Brahmin or Buddhist by the presence of one or other tree.

Banyuls-sur-Mer, a town of France in the Pyrénées Orientales, with a fishing-port on the Mediterranean, close to the Spanish frontier, 21 miles S.E. of Perpignan by rail. The bathing brings many visitors in summer. Pop. 2277.

Banyumas, a town of Java. It is situated at the opening of an extensive and fruitful valley on the left bank of the Serajo, 22 miles from the south coast. Pop. 9000. It is well built, and carries on a considerable trade, is the residence of a Dutch governor, and has a fort and garrison. It is the capital of a province of the same name, which produces coffee, sugar, indigo, rice, tobacco, &c. The area of the province is 2136 sq. m.; pop. (1883) 1,046,405, of whom only 583 were Europeans. The district is low and marshy towards the coast, but very mountainous in the north and east. The volcanic pit at an of Dieng (6700 feet) contains the terrible 'valley of death,' a ravine full of volcanic gases, principally carbonic acid.

Banyuwangi, a prosperous seaport town and military post belonging to the Dutch, on the east coast of Java, capital of a district of the same name, and an important station of the telegraph connecting Europe and Australia. Pop. about 10,000.

Banz, once one of the richest and most famous of the Benedictine monasteries, on the right bank of the Maine, 3 miles below Lichtenfels. Founded in 1071, and destroyed in the Peasants' War in 1525, it was rebuilt, and although plundered again in the Thirty Years' War, it gradually became famed for the scientific attainments of its monks. In 1803 it was broken up, and its library and collections divided between the Munich museum and other institutions.

Baobab (*Adansonia digitata*), a magnificent tree belonging to the natural order Sterculiaceæ



Baobab Tree.

(q.v.), also called the Monkey-bread Tree, is a native of tropical Western Africa, but now introduced into the East and West Indies. It is one of

the very largest trees—not rising to a great height, but exceeding almost all other trees in the thickness of its trunk (20-30 feet). Even its branches (60-70 feet long) are often as thick as the stems of large trees, and they form a hemispherical head of 120-150 feet in diameter; their outermost boughs drooping to the ground, with large horse-chestnut-like leaves, and huge white solitary drooping flowers. The fruit (Monkey-bread) is of the size of a citron. The pounded leaves are mixed with the daily food of the inhabitants of tropical Africa; and Europeans in that country employ them as a remedy for diarrhoea, fevers, and diseases of the urinary organs. The pulp of the fruit is pleasant and slightly acid; and the expressed juice mixed with sugar is much esteemed as a refreshing and cooling beverage, specially grateful in fevers. The bark is said to be powerfully febrifugal, and yields a very strong fibre, but the wood is soft and readily attacked by fungi.

Bapaume, a French town, department of Pas-de-Calais, 12 miles S. of Arras. Here, on the 2d and 3d January 1871, took place two bloody struggles between the French army of the north and the Prussian 'army of observation'; the French were defeated, with a loss of over 2000. Pop. 3190.

Baphomet, the alleged name of a mysterious idol which the Templars were accused of worshipping. According to the oldest and most common interpretation, the word is a corruption of Mahomet, to whose faith the members of the order were accused of having a leaning. The symbol consisted of a small human figure, having two heads, male and female, and environed with serpents, the sun, and moon. Hammer, with little probability, explains the word as formed from Gr. *baphe* ('baptism') and *metis* ('wisdom'), the Gnostic baptism a species of spiritual illumination, which was interpreted sensually by later Gnostics, to whose licentious practices he declares them to have been addicted. According to L'Abbé Constant's *Dogme et Rituel de la haute Magie*, quoted by Littré, the word was cabalistically formed by writing backwards *tem. o. h. p. ab.* abbreviation of *templi omnium hominum pacis abbas*, 'abbot (father) of the temple of peace of all men.'

Baptism (Gr. *baptismos*, from *baptizo*, frequentative of *bapto*, 'I dip or dye'), one of the Sacraments (q.v.) of the Christian church, deriving its name from the rite of washing with water, which forms an essential part of it. Baptism is almost universally acknowledged among Christians as a sacrament, and is referred to the authority of Christ himself, whose express command to administer it is recorded in the gospels (Matt. xxviii. 19; Mark, xvi. 16).

The name and the rite were not altogether new, however, when the ordinance was instituted by Christ. Religious meanings were early attached to washings with water, both by heathens and Jews; they were among the ordinances of the Jewish law; and it is not necessary to go beyond that law to find the origin of the custom of washing or baptizing proselytes upon their admission into the Jewish church. Washing with water was requisite for the removal of ceremonial uncleanness, and every proselyte must have been regarded as ceremonially unclean prior to his admission into the Jewish church. John the Baptist baptised not proselytes upon their renouncing heathenism and entering the Jewish church, but those who, by birth and descent, were members of it, to indicate the necessity of a purification of the soul from sin—a spiritual, and not a mere outward change.

One of the most important of the controversies which have agitated the Christian church as to

baptism, is that concerning the proper subjects of baptism: whether adults only who profess faith in Christ are to be baptised, or if this ordinance is to be administered to their infants also. The baptism of adults was certainly more frequent in the apostolic age than it has ordinarily been since, for which an obvious cause presents itself in the fact that the first members of churches were converts from Judaism or from heathenism. It is generally held, however, by those who advocate the baptism of infants, that it was the practice of the apostles and of the church of the apostolic age to baptise the infants of Christians (cf. Acts, xvi. 15, 33; 1 Cor. i. 16). This again is as stoutly denied by others, who allege that infant baptism crept in along with other corruptions. For neither opinion can any positive historical proof be adduced, the arguments on both sides being mainly inferential.

The chief arguments in favour of infant baptism are based upon the proposition that the church is one throughout all changes of dispensation. From this it is argued that as infants were, so they still must be included, in the visible church. It is maintained that in all covenants which God has made with men, their children have been included; that the covenant with Abraham was a renewed revelation of the covenant of grace, the temporal promises made to him being connected with the greatest spiritual promises; that circumcision was a seal of the covenant with respect to these, in which the children of Christians have the same interest that Jewish children had; and that baptism is a seal of the covenant now as circumcision was, the things to which it has immediate reference being also blessings which children are capable of receiving. It is contended that the arguments in favour of infant salvation derive additional strength from that view of the place of infants in the church according to which they are entitled to baptism. The passages which connect baptism with faith are regarded as exclusively relating to adults, like the passages which connect salvation with faith and repentance. In reply to the argument that there is no express command for infant baptism, it is argued that the state of the case rather demands of those who oppose it the production of an express command against it, without which the general command must be held to include it; the words and actions of our Saviour (Mark, x. 14) with respect to children are quoted as confirming the opinion that the place of infants in the church is precisely what it was under the Jewish dispensation; and it is contended that it would have been a very great restriction of privilege in the new dispensation if infants had been excluded from a place which they held before, as entitled to a seal of the covenant, whereas it is evident that the new dispensation is characterised not by restriction but by enlargement of privilege (Acts, ii. 39). For the arguments on the other side, see BAPTISTS.

It is admitted, on all hands, that at an early period in the history of the church, baptism was administered to infants, although, even after it had been set forth as an apostolic institution, its introduction into the general practice of the church was slow. The earliest direct evidence claimed for the practice is a passage from Irenæus, who flourished in the 2d century. Tertullian, who came a little later, looked with disfavour on infant baptism; but it was regarded by Origen (*circa* 185-254) as an apostolic institution. As such it was acknowledged in the North African church and in the Alexandrian and Syro-Perlican churches in the 3d century; though it was not until the 5th century that it became fully established as the general practice of the Christian church. This it has unquestionably continued to be from that period to the present day; feebly opposed by some of the

sects of the middle ages, and more vigorously by some Protestants. See BAPTISTS.

Both the practice and the neglect of infant baptism in the early ages of the church were connected with particular views of religious doctrine, and of the nature and purpose of baptism itself. The prevalence of the Augustinian doctrine of Original Sin is generally regarded as a principal cause of the prevalence of infant baptism; whilst Pelagius, although opposing that doctrine, maintained the necessity of infant baptism. No little influence must be ascribed to the growing belief in the absolute necessity of baptism to salvation, and in a sort of mysterious efficacy in the rite itself. It is certain, on the other hand, that the belief in the forgiveness of sins in baptism led to a practice of deferring it as long as possible, in order that all sins might be blotted out at once. Thus the Emperor Constantine the Great was baptised only a short time before his death. The approach of a war or pestilence caused many to rush forward in haste to be baptised, who had previously delayed.

The Anglican and Lutheran churches, like the Roman Catholic, regard the baptism of infants as admitting them into the church, and making them members of Christ's body. Other Reformed churches hold that the children of Christians are included in the visible church from their birth, and therefore entitled to baptism.

Two modes of baptism are practised: by immersion or dipping, and by aspersion or sprinkling, concerning which there has been much controversy in the early period of the church's history, as well as in recent times. Affusion or pouring, the common practice of the Church of Rome, may be regarded as essentially one with sprinkling. The advocates of sprinkling universally admit the validity of baptism administered in the other mode, but the advocates of dipping generally refuse to acknowledge that baptism by sprinkling can be true Christian baptism. The opponents of infant baptism, almost without exception, insist upon immersion; whilst aspersion or affusion of water is general, except in the Eastern churches, wherever the baptism of infants prevails. The argument upon which Baptists depend most of all is that from the word baptism and the verb *baptizo*, which, in classic Greek, signifies to immerse. On the other side, it is contended that a strict limitation to this sense does not well accord with its character as a 'frequentative' form of *bapto*; and instances are adduced from the New Testament itself in which this signification cannot easily be attached either to the noun or to the verb, as 1 Cor. x. 2, where Paul says that the Israelites were 'baptised unto Moses in the cloud and in the sea'; and Heb. ix. 10, Mark, vii. 4, and Luke, xi. 38, where both verb and noun are employed concerning the *washings* of the Jews, and the noun, even of their washing of 'cups, and pots, brazen vessels, and of tables.' To the argument in favour of immersion derived from the phrases employed when baptism is mentioned in Scripture—as when we are told that John the Baptist baptised 'in Jordan' (Matt. iii. 6), that our Lord after his baptism 'went up out of the water' (Matt. iii. 16), that Philip and the Ethiopian eunuch 'went down both into the water' (Acts, viii. 38)—it is replied that all the passages of this description, even if their meaning were certainly as precise and full as Baptists suppose it to be, are insufficient to sustain the weight of the conclusion as to the necessity of a particular mode of baptism; that, on the contrary, it is far from being clear that these passages must be interpreted, or the meaning of the Greek prepositions so strictly defined, as the argument requires; and further, that there are instances mentioned in Scripture which afford a presumptive argument in favour of

another mode of baptism, as when we are told of great numbers being added to the church in one day, whilst there is no intimation of the converts being led to any pool or river to be baptised. To the argument drawn from the language of Paul in Rom. vi. 4, Col. ii. 12 (see BAPTISTS), it is replied that it depends upon a fanciful interpretation of these texts. According to the advocates of baptism by sprinkling, their opponents commit the great error of attaching too much importance to the question of the mode of baptism.

It is, however, indisputable that at a very early period the ordinary mode of baptism was by immersion, in order whereto Baptisteries (q.v.) began to be erected in the 3d, perhaps in the 2d century, and the sexes were usually baptised apart. But baptism was administered to sick persons by sprinkling; although doubts as to the complete efficacy of this *clinical* baptism were evidently prevalent in the time of Cyprian (middle of 3d century). Baptism by sprinkling gradually became more prevalent; and a dispute concerning the mode of baptism became one of the irreconcilable differences between the Eastern and Western churches, the former generally adhering to the practice of immersion, whilst the latter adopted mere pouring of water on the head, or sprinkling on the face. This practice, although generally adopted in the West from the 13th century, was not universal, for it was the ordinary practice in England before the Reformation to immerse infants, and the Fonts (q.v.) in the churches were made large enough for this purpose. It continued to be the practice even till the reign of Elizabeth; and the change which then took place is ascribed to the English divines who had sought refuge in Geneva and other places on the Continent during the reign of Mary. To this day the rubric of the Church of England requires that, if the godfathers and godmothers 'shall certify him that the child may well endure it,' the officiating priest 'shall dip it in the water discreetly and warily;' and it is only 'if they certify that the child is weak,' that 'it shall suffice to pour water upon it;' although the latter, or sprinkling, is now the ordinary practice.

Besides the simple rite of washing with water, and the pronouncing of the formula which declares it to be 'in the name of the Father, and of the Son, and of the Holy Ghost,' baptism was accompanied, from an early period in the history of the church, with various forms and ceremonies. These ceremonies are almost all retained in the Church of Rome, and also generally in the oriental churches, but have been almost entirely laid aside by Protestants. The Church of England retains the sign of the cross made upon the forehead after baptism, but the other Protestant churches in Britain reject it. It was an ancient custom that the *catechumens*, as candidates for baptism were called while receiving instruction with a view to that sacrament, when they were to be baptised, publicly made a profession of their faith and a renunciation of the devil and all his works. The profession of faith is still retained by Protestant churches as the formal ground of the administration of baptism; the renunciation of the devil and his works is required by the Church of England of the person baptised, if an adult, or of the *sponsors* or 'sureties' of a child.—Sponsors (q.v.) were early admitted to answer for those who could not answer for themselves, and particularly for infants. The belief in the absolute necessity of baptism to salvation led even to baptism of the dead among the Montanists in Africa, in which sponsorship was also introduced. Presbyterian and Independent churches generally reject all sponsorship, and regard the profession made by parents as simply a profession of their own faith, which entitles their infants to baptism. The ancient

practice of Exorcism (q.v.) immediately before baptism, has been rejected as superstitious by almost all Protestant churches; as have also that of immersing three times (*trine immersion*), or sprinkling three times, with reference to the three Persons of the Godhead—that of breathing upon the baptised person, 'to signify the expulsion of the devil,' and to symbolise the gift of the Holy Spirit—that of anointing with oil (*Chrism*, q.v.), to symbolise the same gift, or to indicate that the baptised person is ready, like a wrestler in the ancient games, to fight the good fight of faith—that of giving him milk and honey, in token of his spiritual youth, and of his reception of spiritual gifts and graces—that of putting a little salt into his mouth, to signify the wisdom and taste for heavenly things proper to a Christian—that of touching his nostrils and ears with spittle, to signify that his ears are to be ever open to truth, and that he should ever feel the sweet odour of truth and virtue—and that of clothing him after baptism with a white robe (the *chrysom*), in token of the innocence of soul which by baptism he was supposed to have acquired. The white robe and the anointing with oil were retained in the Church of England for a short time after the Reformation.—The giving of a name in baptism (see the article NAMES) is no essential part of it, but is a custom apparently derived from that of the Jews in circumcision (Luke, i. 59-63).—The Church of Rome prefers the use of Holy-water (q.v.) in baptism, but regards any water as fit for the purpose in case of necessity.—According to an ancient usage long obsolete, the ordinary administration of the rite (solemn baptism) was limited to the two great festivals of Easter and Whitsuntide. Whether baptism may be administered in private has been much debated, both in ancient and modern times. The administration of baptism in private houses, and not in the presence of a congregation, was one of the things earnestly contended against by the Presbyterians in Scotland in the first half of the 17th century; their opposition being grounded, not only upon hostility to what they deemed usurpation of authority, but upon the danger of superstitious views of baptism. And apparently upon this latter ground, baptism in private houses is also discouraged by the Church of England, even while it is allowed if there is 'great cause and necessity.' Yet it has become very frequent among the Presbyterians of Scotland.

Some of the most important questions concerning baptism will be most appropriately noticed in the article SACRAMENT, particularly those relating to its place in the Christian system and among the means of grace. The opinions early became prevalent that forgiveness of sins is obtained and spiritual life begun in baptism, and that it is indispensably necessary to salvation—the only exception made, if any was made at all, being in the case of adult believers, who, desiring baptism, were prevented from receiving the rite, and particularly of those who suffered martyrdom, which was generally held to be equivalent to baptism. The Church of Rome still owns, as supplying the place of baptism by water, these two—baptism by desire, and baptism by blood, i.e. martyrdom.—According to the general doctrine of the Protestant churches, baptism is 'a sign and seal' of the covenant of grace, representing as a sign the blessings of the covenant, and as a seal, confirming the covenant. As a sign, it is generally held to represent in its rite of washing, the removal both of guilt and corruption, by the blood and by the Spirit of Christ, and so to relate equally to pardon and regeneration, although some have limited its symbolic reference to regeneration alone. One of the most important points disputed concerning baptism, is that of baptismal regeneration (see REGENERATION).

Some early Christian sects appear to have rejected baptism, on grounds somewhat similar to those on which it is rejected by Quakers (q.v.) at the present day, who explain the passages relating to it symbolically, and insist that a spiritual baptism is the only real baptism of Christians.

There has been much controversy concerning *Lay Baptism*. Wherever there is a recognised ministry in the church, there is a general agreement in confining the ordinary administration of baptism to those who hold this office. It might be expected that the more strongly the necessity of the transmission of *holy orders* by apostolical succession is asserted, the more strongly also would exclusiveness be manifested with regard to the right of the *clergy* to administer baptism. But this tendency is counteracted by the belief in the necessity of baptism, or at least of its great importance to the salvation of infants; so that from an early period lay baptism was allowed, although not without opposition, in cases of apprehended danger; and in the Church of Rome this principle is logically carried out to the fullest extent, so that even women are authorised to administer baptism in cases of necessity. On the same ground, lay baptism was at first permitted in the Protestant Church of England; but the prevalence of other views led to a formal restriction of the right of administering it to 'lawful ministers,' although in practice the validity of lay baptism is still generally recognised.

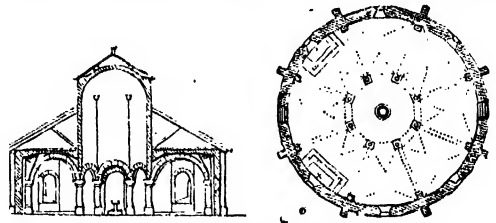
Another question much agitated in the church from early times was that concerning the validity of baptism by heretics. The opinion ultimately prevailed, that baptism by heretics is valid, except in the case of those who do not baptise in the name of the three Persons of the Godhead. This continues to be the almost universal opinion. The Church of Rome, however, employs a form of 'conditional baptism' in admitting a Protestant convert to its communion.

The *baptism of bells, ships, &c.* is a custom supposed to have been introduced about the 10th century, and still retained in the Church of Rome. The term *benediction* is sometimes substituted for that of baptism, but the rite itself is very similar to that of baptism, and is accompanied with many similar ceremonies - a sort of exorcism, sprinkling with holy-water, anointing 'with the oil of catechumens' and 'with chrism,' a formula of consecration 'in the name of the Father, Son, and Holy Ghost,' and sometimes also, if not always, the giving of a name to the bell consecrated, and even a kind of sponsorship as by godfathers and godmothers in baptism.

Bingham's *Ecclesiastical Antiquities*; Godwin, *Christian Baptism* (1845); Ingham (Baptist), *A Handbook of Christian Baptism* (1865); *Christian Baptism: its Subjects* (1871); Hall, *Infant Baptism*; Hodges, *Baptism tested by Scripture and History* (1875); Pusey, *Tracts for the Times*, No. 167; and the article in Dean Stanley's *Christian Institutions* (1882).

Baptistery (Gr. *baptisterion*, 'a large vase or basin'), the name given sometimes to a separate building, sometimes to the portion of the church in which the ceremony of baptism is performed. In the latter case, the baptistery is merely the inclosure containing the font, to be seen in most English churches. According to the earlier arrangements of the Christian Church, however, the baptistery seems usually to have been a building standing detached from, though in the immediate vicinity of the church to which it appertained. It was the ceremonial building of the church, in which large numbers of converts were initiated at one time by immersion in the large font in the centre of the floor. In later times, these early baptisteries were frequently converted into churches, as in the case of Asti. At Novara, a very interesting

baptistery still exists in connection with the open cloister or atrium, to which alone the neophytes



Section and Plan of Baptistery at Asti.

were admitted before baptism. Baptisteries, at first, were either hexagonal or octagonal, but afterwards became polygonal, and even circular.

The celebrated baptistery of Florence is an octagonal structure, measuring about 100 feet in diameter. It stands detached from, but in the immediate vicinity of the west end of the cathedral. It is built of black and white marble, in the style which Giotto is said to have introduced, and which is still peculiar to Tuscany. The magnificent bronze doors, with their beautiful bas-reliefs, are remarkable features of this famous baptistery. The most celebrated of the three doors was executed by Lorenzo Ghiberti, the earliest being the work of Andrea di Pisa. Fifty years were required for their completion; and it is remarkable that the contracts for their execution are still preserved. Next in importance, and of even greater size, is the baptistery of Pisa. It is circular in form, the diameter measuring 116 feet. The largest baptistery ever erected is supposed to have been that of St Sophia, at Constantinople, which was so spacious as to have served on one occasion for the residence of the Emperor Basilicus.

Detached baptisteries were common in the days of the early church, when adult baptism was practised; but on the introduction of infant baptism, buildings of this size were no longer needed, and the baptistery was absorbed into the church (see APSE). Numerous examples of circular baptisteries on the model of the Italian ones are still to be found in the south of France.

Baptists, a body of Christians sometimes called *Antipadobaptists*, as opposed to *Padobaptists*, or those who advocate Infant Baptism. They reject the name of Anabaptists, as expressing what, from their point of view, is not their practice - viz. the rebaptising of converts from Padobaptist communions - for they regard the baptism of professed believers alone as valid - and also as associating them with the scandals of the German Anabaptists (q.v.) of the 16th century, from whom they claim to be historically distinct. Baptists refuse to acknowledge any great name as founder of their sect. They trace their origin to the primitive church itself, and refer to the Acts of the Apostles and the Epistles as affording, in their opinion, incontestable evidence that their leading tenets have the sanction of inspiration. When Christianity became corrupted, their scriptural practice was, they hold, maintained among the Cathari and Albigenses and other sects of the middle ages. They spring into notice in England under Henry VIII. and Elizabeth. They were persecuted under both reigns, but, with other Nonconformists, they received freedom to meet for worship from James II., and complete religious liberty under William III. Ever since, they have been diffusing their principles extensively in Great Britain and North America.

The Baptists hold the plenary inspiration and supreme authority of the Holy Scriptures as a revelation from God; the equal deity of the Son and the Holy Spirit in the unity of the ever

blessed Trinity. But they have amongst them many shades of belief. They have among them Calvinists both *hyper* and moderate, also high and low Arminians. The great body of them in Britain and America hold the doctrine of Calvinism in a modified form—that is to say, they maintain the *sufficiency* of the Atonement for *all men*; the limitation which some have maintained, lies, they consider, in its *application* to the sinner by the sovereign grace of God through faith. At the present day, however—especially in Britain—the tendency of thought is towards the recognition of no other limitation than that which results from the exercise of man's free-will. They maintain the necessity of regeneration and holiness of life as essential to true religion, and that 'without holiness no man shall see the Lord.'

Particular Baptists, so called because holding that Christ died for an elect number, and *General Baptists* (called in America *Free-will Baptists*), who maintain that he died for all men, constitute the two leading sects into which the body is divided. *English Baptists*, in their church order and government, are the same as Congregationalists, the rite of baptism excepted. *Scotch Baptists*, properly so called, insist on a plurality of pastors in every church, and the exercise of mutual exhortation by the members in their public assemblies. There are Baptist churches in England that are *Scotch* in their order, but both in England and in Scotland they are, at the present day, few in number. All the churches in the Baptist Unions of England and Scotland are *English* in their order. There are, besides these great divisions, various small associations of Baptists scattered over Great Britain, America, and the Continent of Europe, whose opinions cannot be gathered up into systematic arrangement. In America, the following communions baptise by immersion, and decline to administer the rite to infants: The *Seventh-day Baptists*, who observe, not the first day of the week, but the seventh, as the day of rest; the *Six Principle Baptists*, so called from the circumstance that their creed is summed up in the six points named in Heb. vi. 1, 2; the *Christian Connection Baptists*, who are Unitarians; the *Disciples* or *Campbellites*, who are understood to teach the dogma of baptismal regeneration; the *Brethren* or *Tinkers* (q.v.), and the *Anti-mission*, or, as they are often called, *Hard-shell* Baptists, who object to all missionary societies and other organised schemes of benevolence, as not having, in their view, the sanction of Scripture. They decline to hold fellowship with those who seek by such means to further the cause of truth and righteousness. Their numbers are falling off from year to year. Some of these are represented in Britain, but their following is very small.

The particular tenet which characterises Baptists among their fellow-Christians is, that baptism is an ordinance the validity of which depends on an intelligent faith on the part of the recipient. Their views on the matter of baptism may be reduced to two heads—the *subjects* and *mode* of baptism. The subjects of the baptismal rite they hold to be believers in the Lord Jesus Christ. They ground their faith in this matter on the following positions—namely: 1st, The Lord in his commission to his apostles associates teaching with baptism, and limits the administration of the rite to the taught. 2d, The Book of the Acts shows how the apostles understood their Master, for they baptised none but believers, or such as appeared to be so. 3d, The kingdom of Christ as it appears in this world is restricted to credibly converted persons, as is shown in his discourse with Nicodemus: 'Except a man be born again, he cannot see the kingdom of God;' whilst his subsequent statements on to the

hour of his memorable confession before Pilate, 'My kingdom is not of this world,' uniformly prove that its subjects and institutes form a distinct and separate community from the Jewish theocracy, which embraced parents and children in nonage in one commonwealth. 4th, They maintain that the ordinance, as explained in the New Testament, always points to a moral and spiritual change, apart from which it were indeed a meaningless ceremony.

As respects the *mode*, the Baptists hold that only immersion in water is baptism. They argue, that the original term *baptizo* conveys this meaning, and no other; that nothing less can possibly answer to the apostle's explanation in Rom. vi. 4, 5, and Col. ii. 12, 'buried with him in baptism, wherein ye were also raised with him;' that the many allusions in the epistles to the churches manifestly bear out this interpretation; and, finally, that the fact of John baptising at a spot selected for the purpose 'because there was much water there,' is perfectly conclusive. For the arguments on the other side, see BAPTISM.

Their form of church-government is congregational. They maintain that the only order of officers remaining to the church, since inspiration ceased, are pastors (otherwise called elders and bishops), deacons, and evangelists; that the number of official persons in each of the apostolic churches cannot be ascertained from the record, but must of necessity have depended—and always must depend on circumstances; that each church is possessed of the power of self-government under its exalted head, Jesus Christ, subject to no foreign tribunal or court of review; that discipline is to be exercised by the rulers in presence and with the consent of all the members, and parties received or excluded at their voice.

The Baptists are divided among themselves regarding communion—one portion receiving conscientious Pædobaptists to the Lord's table and membership; the other refusing this privilege to any but Baptists. The churches of the former are called open communionists; the latter, strict communionists.

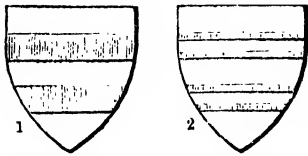
The Baptists were early in the field of missions, their missionary society having been founded in 1792. There has been the honour of planting Christian churches in many parts of India, in Ceylon, in the Bahamas, the West Indies, Africa, and China. No mission band has surpassed the agents of the Baptist Missionary Society in zeal, perseverance, and fortitude. The names of Carey, Marshman, Ward, and Knibb will be had in grateful remembrance by all succeeding generations.

The Baptists have excellent schools for training young men for pastoral duties, presided over by men of great ability. At Bristol, Rawdon (near Leeds), Regent's Park (London), Pontypool, Haverfordwest, and Nottingham, there exist seminaries of learning which are entitled to give certificates qualifying for matriculation at the university of London; and many of the students have already taken degrees and honours there. There are also the Pastors' College, in connection with the Tabernacle, London, and theological institutions at Edinburgh, Manchester, and Llangollen.

In 1886 the Baptists had in the United States (where, next to the Methodists, they are the largest religious body) 31,754 churches, and 2,746,964 members; in Great Britain, Ireland, and the Channel Islands, 2742 churches, with 302,615 members; throughout the world, 37,478 churches, and 3,326,542 members, besides a large number of regular hearers.

Bar, in Heraldry, a diminutive of the Fess (q.v.), or, according to some heralds, a distinct ordinary, consisting of a horizontal stripe across

the shield not exceeding one-fifth of its width. It may be placed in any part of the shield, except ab-



solutely in chief or base, and is hardly ever borne singly—e.g. argent, two bars-gules (fig. 1). It has two diminutives, the closet and the barrulet,

which are respectively a half and a fourth of its width. When barrulets occur in couples they are called bars-gemels—e.g. argent, two bars-gemels-gules (fig. 2).

The occasional use in popular language of 'bar sinister' for baton sinister has arisen from *barre* being the French equivalent for a bend sinister. See BATON SINISTER.

Bar, in Hydrography, is a bank of sand, silt, &c. opposite the mouth of a river, which obstructs or *bars* the entrance of vessels. The bar is formed where the rush of the stream is arrested by the water of the sea, as the mud and sand suspended in the river-water are thus allowed to be deposited. It is in this way that deltas are formed at the mouths of rivers. The navigation of many streams is kept open only by constant dredging or other artificial means.

Bar, in Law. This word has several legal meanings; thus, it is the term used to signify an inclosure or fixed place in a court of justice where lawyers may plead. In the superior courts, Queen's Counsel are admitted within the bar; other members of the bar sit or stand outside. A rail-off space within the Houses of Lords and Commons is in like manner called the bar of the House. The dock, or inclosed space where persons accused of felonies and other offences stand or sit during their trial, is also called the bar; hence the expression, 'prisoner at the bar.' It has also a general meaning in legal procedure, signifying something by way of stoppage or prevention. There is also a trial at bar—that is, a trial before the judges of a particular court, who sit together for that purpose *in Banc* (q.v.). See ADVOCATE, BARRISTER, DOWER, FELONY, PLEA, TOLL, TREASON.

Bar, in Music, is a line drawn across the stave, to divide the music into small portions of equal duration; and to indicate the accent, each of these small portions, called *measures*, are also commonly but improperly termed bars. The *double bar* indicates the conclusion of a composition or of a section thereof.

Baraba', a steppe of Siberia, in the government of Tomsk, extending between the rivers Obi and Irtysh, and occupying more than 100,000 sq. m. Covered with salt lakes and marshes, it was colonised in 1767 by the Russians, who have since cultivated parts of it.

Barabra, a Nubian people living on both sides of the Nile from Wady Halfa to Assuan (Egyptian Soudan). They are about 40,000 in number, and are believed to belong to the same stock as the ancient Egyptians. They are an agricultural people, and zealous Mohammedans. Their language has affinities with Coptic.

Baraco'a, a decayed seaport of Cuba, near the east end of the island, founded in 1512, and the capital of the island for some years. Pop. 3900.

Baraguay d'Hilliers, LOUIS, general, was born at Paris in 1764, and, receiving an appointment in the army of Italy from Napoleon, shared all the success of the campaigns of 1796-97. Made a general of division and commandant of Venice,

in 1798 he accompanied the expedition to Egypt; and afterwards successively held appointments on the Rhine, in the Tyrol, and in Catalonia. He commanded a division in the Russian campaign of 1812, but during the retreat incurred the displeasure of Napoleon; and on 6th January 1813 he died at Berlin of grief and exhaustion.—ACHILLE, his son, was born at Paris in 1795, and, entering the army in 1812, next year lost his left hand at the battle of Leipzig. He held a number of appointments up to 1854, when he received the command of the Baltic expedition; and on the capture of Bomarsund, he was made a marshal. In the Italian campaign of 1859 he distinguished himself at Solferino; and during 1870 he was for a brief time commander of Paris. He died at Amélie-les-Bains, 6th June 1878.

Barante, AIMABLE GUILLAUME PROSPER BRUGIERE, BARON DE, a French historian and statesman, born at Riom in Auvergne, June 10, 1782. After filling some subordinate offices, he was appointed in 1809 prefect of La Vendée. In this year was published his *Tableau de la Littérature Française au XVIII^e Siècle*, of which Goethe has said that it contains neither a word too little nor a word too much. In 1815 Louis XVIII. made Barante secretary of the ministry of the interior, and about the same time he took his seat in the Chamber of Deputies, where he voted with the moderate liberals. In 1819 he was raised to the Chamber of Peers. His principal work, a *Histoire des Ducs de Bourgogne de la Maison de Valois, 1364-1477*, published in 12 vols. 1824-28, has run through several editions. It secured his election to the Academy in 1828. Between 1830 and 1840 he represented France at Turin and St Petersburg, but after the revolution of 1848 he devoted himself entirely to literary pursuits. He died, November 23, 1866, at his country-seat in Auvergne.

Baratynski, JEVGENT ABRAMOVICH, an eminent Russian poet, born within the government of Tambov in 1800, became one of the pages at St Petersburg, but was dismissed at fifteen for some boyish freaks. He enlisted as a private soldier three years later, and by seven years service in Finland fought his way to the rank of an officer, which, however, he soon resigned to devote himself to a literary life. His first poem, *Eda*, is a mirror of Finnish life and feeling; his greatest, *The Gipsy*. He died in 1844 at Naples.

Barbacc'na, a flourishing town of Brazil, in the province of Minas Geraes, 125 miles NW. of Rio de Janeiro. It is situated in the Mantiqueira Mountains, about 3500 feet above the sea. Pop. 5000.

Barba'does, one of the Windward Islands, the most easterly of all the West Indies, lies 78 miles E. of St Vincent, in 13° 4' N. lat., and 59° 37' W. long. Its length is 21 miles; its greatest breadth, 14½ miles; and its area, 166 sq. m., or 106,470 acres, of which no less than 100,000 are under cultivation. At Bridgetown, the capital, is the open roadstead of Carlisle Bay, the only harbour, the island being almost encircled by coral-reefs, which here and there extend as much as 2 miles to seaward. Inside these reefs the coast, excepting at two points, presents long lines of sandy beach. The interior is generally hilly, Mount Hillaby, the loftiest summit, rising 1104 feet above sea-level. Setting aside occasional attacks of yellow-fever, leprosy, and elephantiasis ('Barbadoes leg'), the climate is healthy. The temperature is equable; and the average rainfall is 57 inches. Shocks of earthquake are sometimes felt, and thunderstorms are frequent and severe. But hurricanes are the grand scourge of Barbadoes.

In 1780 one of them destroyed 4326 persons, and property to the value of £1,320,564 sterling; and in 1831 another destroyed 1591 persons, and property to the value of £1,602,800 sterling. Of the former of these, the violence almost surpasses belief—the winds and the waves between them having carried a 12-pounder gun a distance of 140 yards. In 1834, the commencement of the apprenticeship under the imperial act of emancipation, the population was 102,231; by 1881 it had increased to 171,889, being an average of 1035 inhabitants to every square mile. About 18,000 are white, and the rest coloured. The trade and the revenue bear a similar testimony to the benefits of emancipation. Between 1833 and 1884, the revenue had increased from £20,975 to £157,762; the imports, from £481,610 to £1,156,329; the exports, from £408,363 to £1,318,878. The succeeding years showed a considerable falling off. Being everywhere cultivated in regular plantations, the island affords no room for the squatting of negroes on unreclaimed lands, as in Jamaica and other West India possessions. On this account, if from no other cause, the negro population have been compelled to labour diligently for hire, and are generally in a condition most creditable to their industry and prudence, contrasting favourably with some of the lower classes among the whites. Altogether, however, the Barbadians are a shrewd and clever people. Barbadoes was made the see of a bishop in 1824; and the bulk of the population belong to the Anglican communion. It contains Codrington College, and many other well-endowed seminaries. It was first colonised by the English in 1625, having previously been depopulated by the Spaniards. The peace of Barbadoes was seriously disturbed in 1876, by riots occasioned by the proposed confederation of the Windward Islands, in which several lives were lost and great damage done to property. See Schomburgk's *History of Barbadoes* (1848).

Barbadoes Cherry, the name given in the West Indies to the fruit of two small trees, *Malpighia urens* and *M. glabra*, which are cultivated for its sake. The fruit of *M. urens* is small, that of *M. glabra* is like a Mayduke cherry in size and appearance, but inferior in flavour. Each fruit contains three stones. The leaves of *M. urens* have stinging hairs on the under side. See MALPIGHIALE.

Barbadoes Gooseberry (*Pereskia acutata*), a pleasant West Indian fruit, produced by a species of Cactus, with a round stem, thick flat alternate leaves, and large strong spines. The flowers are white and ornamental, and the fruit yellow; they are eaten fresh or preserved.

Barbadoes Leg, the same as *Elephantiasis Arabum*. See ELEPHANTIASIS.

Barbara, ST., suffered martyrdom at Nicomedia, in Bithynia, in 240 or 306. Her father, Dioscorus, a fanatical heathen, delivered her up to the governor, Martianus, who, struck with her intelligence and beauty, attempted first by arguments to make her relinquish Christianity, and when that failed, had recourse to the most exquisite tortures. At last, her father offered himself to behead her; scarce had he done so when he was struck with lightning. Hence St Barbara is to this day prayed to in storms, and is the patron saint of artillery, being represented in art with cannons, a tower, and a monstrance. Her festival is 4th December.

Barbara, Celarent, &c., mnemonic words used in logic to denote certain Syllogisms (q.v.).

Barbar'ca. See CRIES.

Barbarian (Gr. *barbaros*), among the Greeks, as early as the time of Homer, signified one who

could not speak the Greek language; and this restricted signification was not wholly obsolete even in the age of Plato, for the latter divides the entire human race into *Hellenes* and *Barbaroi*. Like the Latin *barbus*, the word is probably onomatopoeic, meant to represent a meaningless babble of sound, such as the Greeks conceived all foreign languages to be. It first began to acquire its secondary and invidious signification at the period of the Persian wars. The Greeks, who always exhibited a proud consciousness of their superior intellect and privileges, employed the term to designate the character of their enemies, as opposed to Greek civilisation, freedom, or intelligence. Subsequently, when Rome, under Augustus, became the mistress of the world, the word was applied to all the Germanic and Scythian tribes with whom she came into contact. In modern times, barbarian signifies savage, uncivilised, or ignorant.

Barbaros'sa. See FREDERICK I.

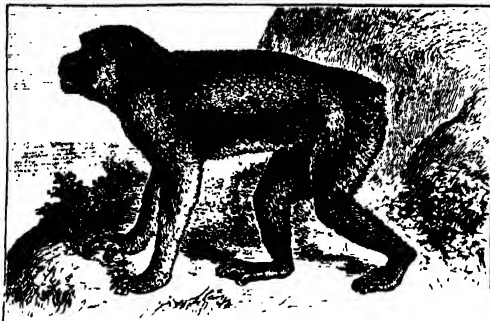
Barbarossa, HORTIK and KHAIR-ED-DIN, two brothers, renegade Greeks, natives of Mitylene, who, as Turkish corsairs, were the terror of the Mediterranean during the first half of the 16th century. The former being invited to Algiers to aid against the Spaniards, treacherously murdered the Emir to whose assistance he had come, seized the town, and began to extend his conquests; but the Arabs summoned the Spaniards to their aid, and in 1518 he was captured and beheaded. The younger brother succeeded him in Algiers, and, having put himself under the protection of the Porte, fortified the town, and even conquered Tunis for the Turks. After Charles V. retook Tunis, Khair-ed-din preyed on the almost defenceless coasts of the Mediterranean, defeated the Christian powers in several sea-fights, and aided the French in taking Nice in 1543. Finally, with thousands of captives, he returned in triumph to Constantinople, where he died, July 4, 1546.

Barbaroux, CHARLES JEAN MARIE, one of the greatest of the Girondists, was born at Marseilles, 6th March 1767. At first an advocate and journalist at Marseilles, he was sent by that city to the Constituent Assembly at Paris. There he opposed the court party, and took part with the minister, Roland, then out of favour. After the events of the 10th of August 1792, he returned to his native town, where he was received with enthusiasm, and was soon after chosen delegate to the Convention. In the Convention he adhered to the Girondists, and belonged to the party who, at the trial of the king, voted for an appeal to the people. He boldly opposed the party of Marat and Robespierre, and even directly accused the latter of aiming at the dictatorship; consequently he was, in May 1793, proscribed as a royalist and an enemy of the republic. He fled to Calvados, and thence with a few friends to the Gironde, where he wandered about the country, hiding himself as he best could for about thirteen months. At last, on the point of being taken, he tried to shoot himself; but the shot misfired, and he was guillotined at Bordeaux, June 25, 1794. This brave and beautiful young Spartan was one of the great spirits of the revolution. There was no loftier-minded dreamer in the Girondist ranks; hardly a nobler head than his fell in that reign of terror. He was 'ripe in energy, not ripe in wisdom,' says Carlyle, or the history of France might have been different.

Bar'bary, an extensive region in Northern Africa, comprising the countries known in modern times under the names of Barea, Tripoli Proper, Fezzan, Tunis, Algeria, and Morocco; and in ancient times, under those of Mauritania, Numidia,

Africa Propria, and Cyrenaica. It stretches from Egypt to the Atlantic Ocean, and from the Mediterranean to the Desert of Sahara, or between 10° W. and 25° E. long., and 25° to 37° N. lat. The north-west of this region is divided by the Atlas Mountains into two parts. Though pertaining geographically to Africa, Barbary is not specially African in any of its characteristics; but in climate, flora, fauna, and geological configuration, belongs to that great region which forms the basin of the Mediterranean. Among the races, besides French and other Europeans, may be mentioned Berbers (Kabyles in Algeria), Moors (or Arabs), Jews, Turks, Kulughis (mixed Moors and Turks), and Negroes. The history of Barbary is a record of successive conquests by Romans, Vandals, Arabs, Turks, and the French (1830). See BERBERS, MOORS, ALGERIA, &c.

Barbary Ape, **PIGMY APE**, or **MAGOT** (*Macacus sylvanus*, or *Inuus caudatus*), a small species of tail-less monkey, interesting as the only form now found in Europe, where it is restricted, however, to the Rock of Gibraltar. There can be little doubt that before the strait was formed which now separates the continents, the ancestors of the Gibraltar family wandered over from Africa in an entirely natural way. The magot inhabits the precipitous sides of the rock, feeding it is difficult to know how, and enjoys a certain measure of protection from firearms in return for the amusement afforded by its manners. It is said on one occasion to have had historic importance by warning the British occupants of a Spanish surprise. Large numbers are often seen together, the females carrying the young upon their backs. It is extremely abundant in some parts of North Africa, inhabiting rocky mountains and woods, displaying great agility in passing from tree to tree, and



Barbary Ape.

often descending in herds to plunder gardens and plantations. It feeds on fruits, roots, &c.; and its fondness for eggs may have given rise to the ancient story of the battle of the pigmies and the cranes. It is of a yellowish-brown colour, paler underneath; and in size resembles a middle-sized dog. The characters generally agree with those of other macaques, differing most conspicuously in the stump-like rudiment of a tail, provided, however, with the usual muscles. The absence of tail and the length of the muzzle make the magot somewhat baboon-like. It is one of the commonest imported monkeys, being often seen in a consumptive state in the company of an organ-grinder, and is capable of learning any number of tricks. In order to this, however, it must be taken young, as the older ones are often sullen and mischievous. It usually walks on four feet, although it can be trained to stand or walk, in a more awkward manner, on two. It is filthy in its habits. Its anatomy was first studied by Galen in the 2d century, and the animal is thus of some historic

interest, as it supplied him with an opportunity of understanding by analogy the anatomy of man when obscurantist regulations made the dissection of the human body all but impossible.

Barbastelle, a bat with hairy lips, a native of England. See BAT.

Barbastro, a town of Spain, in the province of Huesca, 44 miles NW. of Lerida by rail. It is situated on the Vero, and has a cathedral dating from the end of the 15th century. Pop. (1877) 8164.

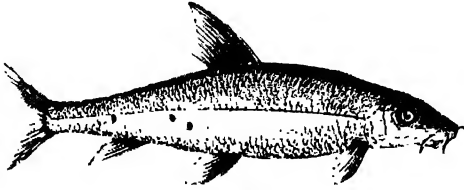
Barbauld, ANNA LETITIA, an English authoress, was born in 1743 at Kibworth-Harcourt, Leicestershire, where her father, the Rev. John Aikin, D.D., a dissenter, kept an academy. Her private education, the religious influence of her home, and her secluded life in the country, were well fitted to develop early her natural taste for poetry; but it was not until 1773 that she published her *Poems*, which ran through four editions in the twelvemonth. Encouraged by this, she the same year, conjointly with her brother, John Aikin (q.v.), published *Miscellaneous Pieces in Prose*. Next year she married the Rev. Rochemont Barbauld, a dissenting minister at Palgrave, Suffolk, in which village the newly married pair opened a boys' boarding-school, which was soon made celebrated by Mrs Barbauld's literary fame and assiduity. During the ten years spent here she published *Early Lessons for Children*, her best work; *Hymns in Prose*, and *Devotional Pieces*. In 1792 she commenced with the same brother the well-known series, *Evenings at Home*. In 1810 she published a collection of the British novelists, the task of editing which she had undertaken to divert her mind from the suicide of her husband two years before. Her last poetical effort was an ode, *Eighteen Hundred and Eleven*, in which she anticipated Macaulay's New Zealander. All her compositions are characterised by an old-world grace, an easy, flowing style, pure and elevated sentiment, and give token of a mind well versed in classical literature. She died at Stoke-Newington, 9th March 1825. See the Memoir by Lucy Aikin, prefixed to the collection of the *Works of A. L. Barbauld* (2 vols. 1825); the Lives by Mrs Le Breton (1874) and Grace Ellis (Boston, U.S. 1874); and Miss Thackeray's *Book of Syllys* (1883).

Barbecue, the name given in America to a hog, ox, or any large animal broiled or roasted whole, and now applied in the United States to a large social entertainment, generally in the open air, where animals are roasted whole, and food and drink of all kinds provided on a generous scale.—The word is probably derived through the medium of Spanish from a Haitian *barbacoa*, 'a framework of sticks raised upon posts, used for supporting above the fire meat that is to be smoked or dried.

Barbed, as a heraldic term, is applied to an arrow whose head is pointed and jagged; also to the five green leaves, or more properly sepals, which are shown between the five petals of the conventional Rose (q.v.) of Heraldry.

Barbel (*Barbus*), a genus of fishes in the family of the Cyprinidae (q.v.), differing from *Cyprinus* (Carp, Gold-fish, &c.) in the short dorsal and anal fins, in having one of the rays of the dorsal fin strong and serrated, and the mouth furnished with four soft tactile barbules (whence the name barbel, from Lat. *barba*, 'a beard'), two near the point of the snout, and one at each angle of the leathery mouth. The upper jaw also extends considerably beyond the lower. The species are very numerous. Like the other Cyprinidae, they are all inhabitants of fresh water, and generally of muddy ponds and rivers, where they seek food, especially at night, by

ploughing up the mud with their snouts like swine, and are said often to seize the small fishes which come to share the worms and insects which they turn up. They also feed upon the leaves and roots of aquatic plants.—The Common Barbel (*B. vulgaris*) is abundant in many of the rivers of the



Barbel.

temperate parts of Europe, such as the Weser, Elbe, and Rhine. It is the only species found in Britain, and there only in some of the still and deep English rivers. It is very abundant in the Thames, frequenting the weedy parts of the river in shoals in summer, and seeking the deeper water in winter, becoming so torpid during cold weather, that the fishermen sometimes take it with the hand, or by pushing it with a pole into a small net fastened to an iron hoop. It grows to a large size, sometimes 3 feet in length, and 15 to 18 pounds in weight; it has a long shape, in section nearly circular; the general colour of the head and upper part of the body, greenish brown, becoming yellowish green on the sides, the belly white, the fins red, and the tail of a deep purple colour. It affords sport to anglers, and is much fished about London, but is a very coarse fish, and little used for food except by the poor, who often boil bacon with it to give it a relish. The flesh is said to be improved by being kept for some days in fresh water. The larger barbels are esteemed the best. The eggs, which are very numerous, are deposited in strings about stones, and the roe has poisonous qualities, although its effects are disagreeable rather than permanently injurious.—A species, called the Binny, or barbel of the Nile, is very abundant in that river; it attains a very great size, 70 lb. or upwards.

Barber, a shaver of the beard (Lat. *barba*), and usually also a hair cutter. Barbers are of great antiquity; the office of the barber is referred to by the prophet Ezekiel (v. 1). In all oriental countries, including China, the shaving the whole or part of the head continues to be performed by barbers. In every part of the world, the professional barber and hairdresser is celebrated for his garrulity and general obliging qualities, such being required by those who place themselves in his hands. The amusing character of the barber in one of the tales in the *Arabian Nights*, and also of the barber in Rossini's opera of *Figaro*, will readily occur to recollection. Barbers at one time acted as a kind of surgeons, and accordingly occupied a higher social position than they now enjoy. Latterly, on account of the simple mode of trimming the hair, and of the prevalence of private shaving, the business of the barber in England has greatly declined, and his services are much more confined to the humbler classes. In the United States, the business of the barber is largely in the hands of the coloured population. Anciently, one of the utensils of the barber was a brass basin, with a semicircular gap in one side to compass a man's throat, by which means, in applying the lather to the face, the clothes were not soiled. Readers will recollect that Don Quixote assumed a barber's basin as a helmet—Mambrino's. At the end of a pole, the brass basin is

still hung out as a sign at the door of the barber in Scotland, Germany, and other countries.

In former times, as already stated, barbers acted as a kind of surgeons, or at least phlebotomists, and such appears to have been the case in all countries. Till this day, on the barber's pole, there is represented a twisted or spiral ribbon, which symbolises the winding of a ribbon round the arm previous to blood-letting. In London, Edinburgh, and elsewhere, the barbers formed corporations with certain privileges. The surgical duties of these bodies now pertain to the corporations of surgeons. The Company of Barber-surgeons was first incorporated by Edward IV. in 1461; in 1540 its title was changed to 'Company of Barbers and Surgeons,' and the practitioners of 'barbery' were restricted to drawing of teeth. In 1545 an act was passed, from whose preamble we learn that the discovery had been made that the business or trade of a barber was 'foreign to, and independent of, the practice of surgery;' and it therefore dissolved the connection between the two bodies, and remitted the barbers to the more humble functions they now perform. But this is done with an express saving of all their privileges as a company or corporation, and as such they exist to the present day. The barbers still retain their ancient hall—which they possessed before the surgeons were disunited from them—in Monkwell Street, Cripplegate, in the city of London. See BEARD, GUILDS, SURGEONS.

Barberini, an Italian family, originally of Tuscan origin, that acquired wealth by trade in the 16th century, rose to the front rank among the Roman nobility, and many of whom were successively cardinals. The family rose to power and influence on the elevation of Maffeo Barberini as Urban VIII. to the papal chair in 1623. His brother Antonio became cardinal; Carlo, general of the papal troops; while to a son of the latter, Taddeo, was given the principality of Palestrina and other fiefs. Francesco (1597-1679), brother of Taddeo, cardinal and vice-chancellor, was founder of the Barberini Library; another brother, Antonio (1608-71), was cardinal and high-chamberlain under Urban VIII. Their increasing power and grasping ambition excited the jealousy of the neighbouring princes, and led to the war (1641-44) in which Odoardo, Duke of Parma, defeated the papal troops. Under Urban's successor, Innocent X., proceedings were instituted against the Barberini, who fled to France; but returned again to Italy in 1652. The principality of Palestrina has belonged since 1630 to the family, while their palace at Rome—long the resting-place of the Portland Vase (q.v.)—gives evidence of their wealth and splendour. Barberino di Val-d'Elsa, a village near Florence, the birthplace of Urban VIII., gives name to the family, one of their palaces being here.

Barberry (*Berberis*), a genus of plants, of the natural order Berberideæ (q.v.). All the species, which number about 100, and range through the temperate regions of the world, with the exception of Australia and South Africa, are shrubs with yellow flowers, having their parts usually in multiples of three. The stamens are sensitive, moving inwards when irritated, so as to dust the insect visitor with pollen, and so facilitate cross fertilisation. The fruit is a berry with two or three seeds. The genus is divided into two sections—those with simple leaves, whether deciduous or evergreen, forming the sub-genus *Berberis* proper, and those with pinnate evergreen leaves, the sub-genus *Mahonia*.—The Common Barberry (*B. vulgaris*) is a native of the Palaæretic region, but has been

introduced into the United States; it is a very ornamental shrub, especially when covered with its brightly coloured berries. The fruit of the ordinary varieties is too acid to be eaten, but makes excellent preserves and jelly, and is also a convenient source of malic acid. Although an



a, Flowering branch, and b, fruit, of Common Barberry (*Berberis vulgaris*);
c, Branch in fruit of *B. Darwinii*.

excellent hedge plant, its extirpation in such localities is advisable, since (as was indeed suspected by agriculturists long before it was demonstrated by De Bary) it furnishes the intermediate host for the 'alcidium-stage' of the fungus which occasions the rust of wheat (see RUST). The yellow root and bark has been used in dyeing, and numerous species are so employed in Chili and Peru, and in the Himalayas; the astringent bark has also been used in tanning. *B. Lycium* is peculiarly astringent, and its extract is employed in North India in ophthalmia. *B. dulcis*, the Sweet Barberry, is a native of Chili; its fruits resemble in size and colour those of the black currant. Wholesome and pleasant fruits are produced also by *B. aristata* and *B. asiatica*, the berries of both of which are dried in Nepal, after the manner of raisins, and by several other species; but more frequently they are insipid or harsh, especially in *Mahonia*. New species and varieties are frequently introduced, and are ornamental, easily cultivated additions to the shrubbery.

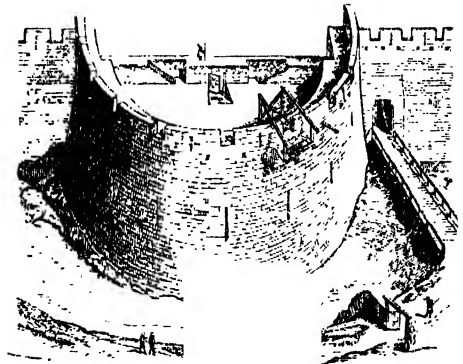
Barberton, a mining-town of the Transvaal, at the De Kaap gold-fields. It is situated at the base of a high range of hills 2500 feet above sea-level, 292 miles N. of Durban, with which there is connection by coach. Since 1883 gold prospecting in the Transvaal had begun to attract more attention, and in 1886-87, owing to the announcement of the discovery of rich reefs in this neighbourhood, there was a 'rush' to the place, which is named after one of the earliest prospectors. The population, about 8000 in 1887, was being rapidly augmented from all quarters.

Barbet (*Bucco*), a genus of birds typical of a family generally placed beside the Picidae, or Woodpeckers (q.v.), and also exhibiting points of resemblance to the cuckoos. They have a large conical beak bearing at the angle of the mouth tufts of stiff bristles directed forwards—a characteristic from which the name barbet is derived (Lat. *barba*, 'a beard'). They prey on insects, some

of them also on young birds, and some at least partially frugivorous. They inhabit warm parts both of the eastern and western hemispheres, and most of them are birds of gay plumage. The Barbicans (*Pogonias*), the American Puff-birds (*Tamias*), and other genera, are included along with the barbets in the family Bucconidae; but it must be noted that not a few forms once referred to the genus *Bucco* are now known under different titles. See PUFF-BIRDS.

Barbette, an earthen terrace inside the parapet of a rampart, serving as a platform for heavy guns, and having such an elevation that the guns may be fired over the crest of the parapet instead of through the embrasures, to give them a freer scope by swivelling round into different directions.

Barbican (Old Fr. *barbucane*, also in Spanish, Portuguese, and Italian forms; perhaps of Arabic or Persian origin—Colonel Yule suggests *bāb-khānah*, 'gate-house,' the usual name in the East for a towered gateway), a projecting watch-tower over the gate of a castle or fortified town. The term barbican was more specially applied to the outwork, intended to defend the drawbridge, which



Barbican at Carcassonne.

in modern fortifications is called the *tête du pont*. There are a few perfect barbicans remaining in England, as at Alnwick and Warwick; but the best example of one, as well as of the other parts of the fortification of the middle ages, is probably to be seen at Carcassonne. The street called Barbican in London, near Aldersgate Street, marks the site of such a work, in front of one of the gates of the old city.

Barbier, (1) ANTOINE ALEXANDRE, a French bibliographer, born at Conlommiers, January 11, 1765. Bred to the church, he subsequently left his curacy, married, and in 1794 removed to Paris, where he was appointed to collect and place in the public libraries the books of the suppressed monasteries. In 1798 he became librarian to the Directory, and as private librarian to Napoleon (1807), founded the libraries of Fontainebleau, Compiègne, St Cloud, and the Louvre. He held the same appointment under the Bourbons until 1822, and died in Paris, December 5, 1825. His most important work is his *Dictionnaire des Ouvrages Anonymes et Pseudonymes* (Paris, 1806-9; 3d ed. 4 vols. 1872-79).—(2) HENRI AUGUSTE, a French satirist, born at Paris, April 28, 1805. Abandoning the bar for a literary career, he made a first venture with an historical novel, but the Revolution of July 1830 led him to make his first essay in the field of satirical poetry. His satires of this period are collected in a volume entitled *Jambes* (1831), which has been so popular that a 31st edition appeared in 1882. His subjects include office-seeking and the greed and ambition

of public men, the corruption of public morals, and the mania for committing suicide. But his later works show an astonishing falling off, and are all distinctly inferior to his earlier efforts. The list includes *Il Pianto* and *Lazare*, republished together (1837) under the title *Satires et Poèmes*; *Pot-de-Vin* (1840), *Rimes Heroïques* (1843), a metrical translation of Shakespeare's *Julius Cesar* (1848), *Silves*, *Poésies Diverses* (1864), *Satires* (1865), a volume of romances, *Trois Passions* (1867), and his posthumous *Souvenirs* (1883) and *Poésies* (1884); but in none can the brilliant author of *Iambes* be recognised. He was elected a member of the French Academy in 1869, and died at Nice, February 14, 1882.—(3) PAUL JULES, a French dramatist, born at Paris, March 8, 1825. His first drama, *Un Poète*, was produced with considerable success at the Théâtre Français in 1847. Since then he has written numerous dramas, comedies, and vaudevilles, and furnished, often with the collaborator of Carré, a constant succession of libretti for Gounod, Thomas, Massé, and Meyerbeer.

Barbou, the name of a celebrated French family of printers, the descendants of John Barbou of Lyons, who lived in the 16th century. From his press issued the beautiful edition of the works of Clement Marot in 1539. His son, Hugh Barbou, removed from Lyons to Limoges, where, among other works, his celebrated edition of *Cicero's Letters to Atticus* appeared in 1580. Joseph Gerard Barbou, a descendant of the same family, settled in Paris, and continued in 1755 the series of Latin classics in duodecimo—rivals to the Elzevirs of an earlier date—which had been begun in 1743 by Constelier. This series of classics is much prized for its elegance and correctness.

Barbour, JOHN, the father of Scottish poetry and history, regarding whose life but little is on record beyond the production of the national epic, *The Brus*. Nothing is known of his parentage, and of his birth it can only be conjectured to have been about 1316. The ascertained facts of his life are few. We are informed only that in his own age he was accounted a man of great learning and worth; that he was Archdeacon of Aberdeen as early at least as 1357, and held that office till his death in 1395; that in 1357 he travelled into England, accompanied by three scholars, for the purpose of studying at Oxford; that he repeated his visit to England for the same purpose in 1364; that in 1365 he obtained a passport 'to travel through England with six companions on horseback towards St Denis and other sacred places'; that in 1368 he again received permission to travel through England with two servants and two horses, on his way to France; that in 1373 he was clerk of audit to the household of King Robert II., and one of the auditors of exchequer; that in 1375 his great poem was more than half finished; that in 1377 he had a gratuity of ten pounds from the king; that in 1378 he received a perpetual annuity of twenty shillings, which in 1380 he bequeathed to the dean and chapter of Aberdeen, under the condition that they should sing a yearly mass for the repose of his soul; that in 1381 he had a gift from the crown of the ward of a minor, whose estate lay within the parish of which he was rector; that in 1382, and again in 1384, he was one of the auditors of exchequer; that in 1388 a further pension was granted him of ten pounds a year; and that he died on 13th March 1395, his anniversary in the cathedral of Aberdeen being celebrated on that day until the Reformation. Besides *The Brus*, Barbour wrote other two poems, one, now represented only by two fragments, on the Troy legend, and *The Book of Legends of the Saints*,

discovered by Mr Bradshaw in Cambridge University Library. Modelled on the *Thebais* of Statius, *The Brus* is distinguished by great purity and clearness of style, the language and versification contrasting advantageously with those of any contemporary English poet, not even Chaucer excepted. Barbour's imagery is not rich, but he is seldom other than lively, simple, and energetic. He has depicted, in rough but faithful outline, the life, manners, and deeds of a truly heroic age, and given to his country the first poem in her literature, and the earliest history of her best and greatest king. *The Brus*, first printed at Edinburgh in 1571, has been reprinted by Dr Jamieson in 1820; by Cosmo Innes, for the Spalding Club, in 1856; and by Professor Skeat, for the Early English Text Society, in 1870-77. Of the *Legends of the Saints* there is an excellent German edition by Horstmann (2 vols. Heilbronn, 1881-82).

Barbu'da, one of the Lesser Antilles, West India Islands, lying 30 miles to the north of Antigua, of which it is a dependency. It is about 10 miles long by 8 broad, with an area of 75 sq. m., and a pop. of 850. The island is fertile, but the greater part of the interior is a dense forest. Barbuda is of coral formation, and is beset with reefs.

Barby, a town of Prussian Saxony, on the left bank of the Elbe, 15 miles SE. of Magdeburg. It is well built, and has an old castle. Pop. (1885) 5522, engaged in sugar-refining, shipbuilding, agriculture, and river navigation.

Barca, a country extending along the northern coast of Africa, between the Great Syrtis (now called the Gulf of Sidra) and Egypt. Bounded on the W. by Tripoli, and on the S. by the Libyan Desert, it is separated from Egypt on the E. by no definite line. It nearly corresponds with the ancient Cyrenaica (q.v.); and a great part of it is a high plateau. The climate is healthy and agreeable in the more elevated parts, which reach a height of almost 2000 feet, and in those exposed to the sea-breeze. There are none but small streams, but the narrow terrace-like tracts of country are extremely fertile, realising all that is said of the ancient Cyrenaica. Rice, dates, olives, saffron, &c. are produced in plenty. The pastures are excellent; the horses still celebrated, as in ancient times. But the good soil extends over only about a fourth of Barca: the east exhibits only naked rocks and loose sand. Many ruins in the north-western parts attest its high state of cultivation in ancient times, when its five prosperous cities bore the title of the Libyan Pentapolis. So early as the time of Cyrus, Barca became a state, which proved dangerous to the neighbouring state of Cyrene; but within a single century it sunk, and became subject to Egypt. In the Roman period, its inhabitants were noted for their predatory incursions. It was afterwards a province of the Greek empire, and had declared itself independent when the Arabs invaded and conquered it in 641. The present inhabitants consist of Arabs and Berbers. Barca was formerly a department of Tripoli; but in 1879 it was raised to the rank of an independent province, governed directly from Constantinople. Its area is 60,700 sq. m.; and the pop. somewhat exceeds 300,000. The capital is Bengazi (q.v.).

Barcarolle (Ital. *barcarola*, 'a boatman'), a species of song supposed to have originated amongst the gondoliers of Venice, having a simple, regular melody, in a rhythm corresponding to the stroke of the oar. The name is applied to musical compositions for voice or pianoforte of a similar character; and its form has been freely used by Auber, Mendelssohn, and Chopin.

Barcello'na and **Pozzo di Gotto**, two towns of Sicily, in the province of Messina, standing close together, so as really to form one town, the two parts of which are separated by a small stream, about 22 miles WSW. of Messina. Pop. of the two towns (1881) 13,948. Barcello'na is situated in a broad plain, between the mountains and the sea, abounding in corn, wine, oil, and fruit, and has sulphur-baths.

Barcelona, the second largest and the most important manufacturing city in Spain, in the province of the same name, is beautifully situated on the Mediterranean between the mouths of the Llobregat and the Besos, in the midst of a district as luxuriant as a garden. By rail it is 228 miles E. of Saragossa and 439 ENE. of Madrid. The ramparts and citadel have given place to the expansion of the city, and the ground formerly covered by the citadel has been laid out in gardens. The castle of Montjuich commands the town from the south, and the arsenals near by comprise infantry and cavalry barracks for 7000 men. Barcelona is divided into two parts—the old town and the new—by the *Rambra* (river-bed), which has been formed into a beautiful promenade. There is another fine promenade, the *Muralla del Mar*, or sea-wall. The streets of the old town, forming the north-west division, are crooked, narrow, and ill paved. The buildings are chiefly of brick, four or five stories high, with flat roofs. Those of the new are much more modern in appearance, spacious, and regular. There is a large suburb to the SE. of the town, called *Barceloneta*, where the seafaring portion of the population chiefly reside. The suburbs of *Gracia* (35,000 inhabitants), to the NW., and *Sarria*, are favourite holiday and summer evening resorts of the inhabitants. Barcelona is the see of a bishop. It has a university (1430; rebuilt 1873) attended by 2500 students, and colleges and schools; public libraries, in one of which there is a splendid collection of MSS.; several hospitals and other charitable institutions; a dozen theatres, one of them capable of holding 4000 spectators; numerous ancient and elegant churches; eighteen convents, and a cathedral which, begun in 1298, is not yet completed. Electric lighting has been introduced, and an International Exhibition was held here in 1888. Barcelona manufactures silk, woollens, cottons, lace, hats, firearms, hardware, blocks from stone-dust, &c., which form its principal exports. Its fabrics are inferior to English goods, and it is said that they are exported to England and reimported with British marks and labels. The staple imports are raw cotton, coffee, sugar, and other colonial produce; also wheat, spirits, timber, salt-fish, hides, wax, iron, and coal. Its export trade is largely confined to fruits, vegetables, wines, silk, oil, and salt. Next to Cadiz, it is the most important port in Spain. The number of ships annually entering and leaving the port is about 4000, with a tonnage of 1,700,000. The harbour was extended and its entrance improved in 1875, but great engineering skill and constant dredging have been required to convert the open roadstead into a safe harbour. The annual imports average 10 to 12 millions sterling; but the decadence of the export trade has become every year more pronounced, its value being returned in 1886 at £105,000. The city has excellent railway communication, with lines of tramway for street traffic. Steamers run to various Mediterranean ports, including the Balearic Islands. In 1864 the population was 190,000; in 1868 it had been reduced (mainly by cholera) to 167,095; (1878) 249,103; (1884) 246,400. Since then it has grown very rapidly, and the population of the city, with its suburban towns and villages, was officially estimated in 1887 at 430,000.—The province of

Barcelona has an area of 2950 sq. m., and a population of (1884) 849,887.

Barcelona is a place of great antiquity, and associated with many historical events. Local tradition fixes the date of its foundation 400 years before the Romans; and it is said to have been refounded by Hamilcar Barca, the father of Hannibal, from whom its ancient name, *Barcino*, was derived. An important city under the Romans, Goths, and Moors, Barcelona in 878 became an independent sovereignty, under a Christian chief of its own, whose descendants continued to govern it, and to hold the title of Counts of Barcelona until the 12th century, when its ruler adopted the title of King of Aragon, to which kingdom it was annexed. During the middle ages, Barcelona became a flourishing seaport, rivalled in the Mediterranean by Genoa only. To its commercial code, framed in the 13th century, much deference was paid by the whole of Europe; and it was at this time 'a city of commerce, conquest, and courtiers; of taste, learning, and luxury; and the Athens of the troubadour.' It was one of the first cities of Spain into which printing was introduced. Columbus was received here in 1493 by Ferdinand and Isabella, after his discovery of America. Here also a ship was launched in 1543, which was moved by means of steam. In 1640 it appealed to France against the tyranny of Philip V.; but it turned against that country in the war of the Spanish Succession, and adhered to Austria. In 1705 the fortress of Montjuich was surprised and captured by Lord Peterborough, and the city surrendered shortly afterwards. In 1714, after a most heroic defence, it was stormed by the Duke of Berwick, on behalf of Louis XIV., and given over to fire and sword. Napoleon perfidiously obtained possession of it in 1808; and with one or two reverses, and in the face of great difficulties, it was held by the French until the treaty of peace concluded in Paris in 1814. For 13 years, Barcelona remained quiet under the iron rule of España; but in 1827 its old turbulent spirit returned, and it rose in favour of Don Carlos. Since that time Barcelona has generally supported the government. But a Progressist rebellion in 1856 caused much bloodshed, and in 1874 the Federalists raised an insurrection here.

Barcelona, formerly called New Barcelona, capital of a district in the state of Bermudez, Venezuela, stands near the mouth of the Neveri, 160 miles E. of Caracas. The surrounding country is fertile, but Barcelona is very unhealthy. Cattle, jerked-beef, hides, indigo, cotton, and cacao are the chief exports. Pop. 12,000.—The district, formerly a separate state, has since 1881 formed one of the divisions of the state of Bermudez.

Barclay, ALEXANDER, poet and prose-writer, was born about 1475, almost certainly in Scotland, may have studied at either or both of the English universities, and then travelled in France and Italy. Some time before 1508 he was appointed, through Bishop Cornish, a priest of Ottery St Mary, Devonshire. About 1511 he became a monk of the Benedictine monastery of Ely; later he assumed the Franciscan habit at Canterbury; and he died at Croydon in June 1552, six weeks after he had been presented to the rectory of All-Hallows, London. His claim to notice rests chiefly upon his famous poem, *The Ship of Fools of the Worlde*—partly a translation, and partly an imitation of the German *Narrenschiff* by Sebastian Brandt (q.v.)—printed by Pynson in 1509. He also published *The Castell of Labour*, *The Egloues* (Eclogues), a translation of Sallust's *History of the Jugurthine War*, &c. See the admirable edition of the *Ship of Fools* by T. H. Jamieson (2 vols. Edin. 1874).

Barclay, JOHN, author of the *Argenis*, was born in 1582, at Pont-à-Mousson in Lorraine, where his father, a Scotsman, was professor of Law. Owing, it is said, to persecution on the part of the Jesuits, he came with his father to England about 1603, and either in that year, or two years later, he published his *Euphormionis Satyricon*, a politico-satirical romance, chiefly directed against the Jesuits, supplements to which were the second part (1607), the *Apologia* (1611), and the *Icon Animorum* (1614). In 1616 he left England, and went to Rome, where he died, a good Catholic, in 1621. In the same year appeared his *Argenis*, according to Cowper, 'the best romance that ever was written.' It was written in Latin, and has been translated into Spanish, Italian, Polish, &c. There are no fewer than three English versions, the last by Clara Reeve in 1772. It is a political allegory, containing clever allusions to the state of Europe, more particularly of France, during the time of the League; and has merited the admiration of readers as dissimilar as Richelieu, Leibnitz, and Coleridge. See Dupond, *L'Argenis de Barclay* (1875).

Barclay, JOHN, M.D., anatomist, was born 10th December 1758, in Perthshire, Scotland, and died in Edinburgh, 21st August 1826. He was educated at St Andrews, and studied for the ministry, but afterwards devoted himself to medicine. He obtained the degree of M.D. from the university of Edinburgh in 1796, where he became a private lecturer, and in 1804 he was formally recognised as lecturer on anatomy and surgery by the College of Surgeons. He was mainly instrumental in founding the Dick Veterinary College in Edinburgh. He published between 1803 and 1822, *A New Anatomical Nomenclature, Muscular Motions, Arteries of the Human Body, and An Inquiry into the Opinions concerning Life and Organisation*.

Barclay, REV. JOHN (1734-98), the founder of the Bereans (q.v.).

Barclay, ROBERT, the celebrated apologist of the Quakers, was born at Gordonstown in Morayshire, December 23, 1648. His father belonged to an old Scottish family, had served under Gustavus Adolphus, and was in some trouble after the Restoration for his conformity with Cromwell. Robert was educated at the Scots College at Paris, of whom his uncle was rector; and here he withstood every temptation to embrace the Roman Catholic religion, and returned to Scotland in 1664, in compliance with the wish his mother had expressed on her death-bed. In 1667 he followed the example of his father—a convert in 1666—and joined the Society of Friends, for reasons more highly respected in our day than in his own. He states in his *Treatise on Universal Love*, that his 'first education fell among the strictest sort of Calvinists,' those of his country 'surpassing in the heat of zeal not only Geneva, from whence they derive their pedigree, but all the other so-called reformed churches;' that shortly afterwards, his crossing to France had thrown him among the opposite 'sect of papists,' whom, after a time, he found to be no less deficient in charity than the other; and that, consequently, he had refrained from joining any, though he had listened to several. The ultimate effect of this was to liberalise his mind, by convincing him of the folly and wickedness of religious strife. In both Calvinists and Catholics he found an absence of 'the principles of love,' 'a straitness of doctrine,' and a 'practice of persecution,' which offended his idea of Christianity, as well as the gentleness and generosity of his nature. He therefore allied himself gladly to this new sect, whose distinguishing feature was its

charity and pure simplicity of Christian life, and soon became one of its most devoted adherents and its ablest advocate. He continued to prosecute his studies ardently, married Christian Mollison in 1670, became involved in controversies in which he showed himself the superior in logic and learning, no less than in tolerance. In 1672 he startled the self-complacent city of Aberdeen by walking through its streets in sackcloth and ashes. He suffered much persecution, and was frequently imprisoned, but at last found protection in the favour of the Duke of York, afterwards James II. He made several journeys into Holland and Germany, the last in company with William Penn and George Fox. He continued to have much influence with King James, was one of the twelve Quakers who acquired the proprietorship of East New Jersey in 1682, and was appointed its nominal governor. He was a frequent visitor to London, but continued to live at Urie, where he died, leaving three sons and four daughters, October 3, 1690. His estate remained in his family till the death of Captain Barclay, the famous pedestrian, in 1854. Barclay's works were collected in 1692 in a folio volume, entitled *Truth Triumphant*, republished in 3 vols. in 1717-18. Of these the greatest is *An Apology for the True Christian Divinity, as the same is held forth and preached by the People called in scorn Quakers* (1678). It contains a statement and defence of fifteen religious propositions peculiar to the Friends. The leading doctrine which runs through the whole book is, that divine truth is made known to us not by logical investigation, but by intuition or immediate divine revelation to the heart of the individual; and that the faculty by which such intuition is rendered possible is the 'internal light,' the source of which is God, or, more properly, Christ, 'who is the light that lighteth every man that cometh into the world.' This light is given to every man, but is obscured by human corruption. The authority of the Scriptures gives only a 'secondary rule,' subordinate to that of the inward light, and the ordinary Augustinian notions of justification, perfection, and perseverance, imply rather a change in the outward relations than a transformation of the soul that accepts the divine light. The identity of this in the main with the teaching of a large school within the English church of the present day, is obvious. The fourteenth proposition deals with the question of toleration and the right of freedom for the conscience, his assertion of which fits well with his theory of divine light within all men of whatever creed or country. The author distinguishes carefully between the divine light and natural reason; but others who identify the two, find in Barclay's great work a series of excellent arguments for deism. Indeed, he was accused of deism even in his own time, and he is mentioned with favour by Voltaire. Brown of Wamphray, in his *Quakerism the Pathway to Paganism* (1678), denounces the 'hellish neo-paganism' of this 'devil in Samuel's mantle,' and speaks of his 'serpentine venom' as 'sugared over with fair speeches.' Barclay's famous work has often been reprinted, and has been translated into most of the European languages. His *Treatise on Universal Love* (1677) was the first of that long series of noble and gentle remonstrances against the criminality of war that has so honourably distinguished the Society of Friends.

Barclay-Allardice, ROBERT, known as Captain Barclay, the pedestrian, was born in 1779, and succeeded to the estate of Urie, near Stonehaven, in 1797. He entered the army (1805), and served in the Walcheren expedition (1809), but afterwards devoted himself to agriculture, cattle-breeding, and the claiming of earldoms (Airth, Strathearn, and

Monteith). He died 8th May 1854. His great feat of walking 1000 miles in 1000 consecutive hours took place at Newmarket in June to July 1809. See W. Thom's *Pedestrianism* (1813).

Barclay de Tolly, MICHAEL, PRINCE, a famous Russian general, was born in 1761 in Livonia. He was descended from the same Scottish family to which Barclay the poet and the Quaker apologist both belonged, and two of the branches of which had settled in Mecklenburg and Livonia. Entering a Russian regiment of cuirassiers as a sergeant, he fought with great bravery in the Turkish war of 1788-89, in the campaign against Sweden in 1790, and in those against Poland in 1792 and 1794, and rose rapidly in rank. He commanded Benningsen's advanced-guard at Pultusk in 1806; and lost an arm at the battle of Eylau. Scarce recovered from his wound, he took part in the war in Finland, defeated the Swedes, crossed the Gulf of Bothnia on the ice at the head of 6000 men, and quickly forced the enemy to sue for peace. Spite of his unpopularity as a German with the Russian national party, he was appointed minister of war by the Emperor Alexander in 1810—an office which he held till 1813. In 1812 he was made commander-in-chief of the army of the west. Here, though face to face with the greatest general and one of the finest armies of modern times, he showed himself such a consummate tactician that his defeats never became disasters. The plan of defence during the campaign is generally ascribed to his insight and wisdom. His advice was to avoid battles and retreat into the interior before the French, leaving the country behind them a desert, and thus the Russian army would ever become stronger as the French grew weaker. He had offered the same advice after Eylau in 1807, but Bagration, the impetuous leader of the second army, was eager to assume an offensive attitude, and the army, weary of constant retreat, supported him against his more cautious colleague. Accordingly, Barclay de Tolly was forced to give battle at Smolensk, and in consequence of his defeat had to yield the supreme command to Kutusow until the death of the latter gave it to him again. At Moskwa he commanded the right wing; at Bautzen he commanded the entire army. He afterwards commanded the Russian army in Bohemia, and took part in the battles of Dresden, Kulm, and Leipzig. He was commander-in-chief of the Russian army in France, and in consequence of this was made a prince and a field-marshal. He died 14th May 1818, at Insterburg, on his way to the Bohemian baths. Two or three years before his death, the estate of Tolly or Towie-Barclay, in Aberdeenshire, the old inheritance of his family, was for sale, but he refused to buy it on the ground that his family had been so long expatriated that Scotland was now to them a strange country. Statues of him were erected at St Petersburg in 1837, and at Dorpat in 1846.

Bar-cochba, SIMON, the leader of the Jews in their great insurrection against the Romans, under the Emperor Hadrian, from 131-135 A.D. Three times had the oppressed Jews revolted without success, from 115 to 118; and in 130, soon after Hadrian's return from Syria, a new rebellion broke out, for which they had been secretly preparing. At the head of it was one Simon, who assumed the name of Bar-cochba, i.e. 'Son of the Star,' pretending that the prophecy was to be fulfilled in him, 'There shall come a Star out of Jacob' (Numb. xxiv. 17). He fought at first with great success against the Romans, and even obliged them to evacuate Jerusalem, where he was proclaimed king, and caused coins to be struck with his name. The war spread over all the country of Palestine,

and fifty towns, besides many villages and hamlets, came into the possession of the Jews. But on the arrival of Hadrian's general, Julius Severus, Jerusalem was retaken; and in August 135, Bethor, the very last strong fortress held by the Jews, was stormed by the Romans. Bar-cochba fell on the day of this bloody conquest. Many thousands of Jews perished in this last attempt to regain political independence, and many were executed after its failure. From this last fatal struggle dates the final dispersion of the Jews over the face of the earth.

Bard, a fortress and village in the Italian province of Turin, situated on the left bank of the Dora Baltea, about 23 miles S.E. of Aosta. When the French crossed the St Bernard in 1800, the fortress of Bard, manned by 400 Austrians, maintained for ten days a resistance to their further advance into Italy. Ultimately Napoleon contrived to elude the vigilance of the garrison, and passed by a mountain-track during the night. Bard was taken a short time after by the French, and razed, but in 1825 it was restored. Pop. about 450.

Bard, the name, known to the Romans since 200 B.C., by which the Gauls and other Celtic peoples (British, Welsh, Irish, and Scotch) designated their minstrels. Like the Scops of the Anglo-Saxons, and the Skalds of Scandinavia, the bards celebrated the deeds of gods and heroes at religious solemnities, and the festivities of princes and nobles, accompanying their recitations with the harp or Crwth (q.v.); they excited the armies to bravery, preceded them into the fight, and formed the heralds of princes and the mediators of peace. The institution early disappeared among the Gauls, but lingered long in Wales, Ireland, and Scotland. The bards formed a hereditary order, and exercised a decided national influence. The minstrels among the Celts, as among the Germans, were the organ of the people, and the channel of all historical tradition. It is supposed that in Wales, about 940 A.D., their privileges were defined and fixed by the laws which bear the name of King Howell Dha; and in 1078 the whole order is said to have been reformed and regulated anew by Gryllth ap Conan. At Caerwys, Aberfraw, and Mathraul, there were held from time to time great competitions in minstrelsy, called Eisteddfods (q.v.), at which the judges were appointed by the prince. When Wales was conquered by Edward I. (1284), the bards lost their privileges, and were, according to tradition, persecuted and put to death; but succeeding princes countenanced the institution, and Eisteddfods were repeatedly held under royal commission down to the reign of Elizabeth. See WELSH LANGUAGE AND LITERATURE.

In Ireland, the bards are believed to have been a hereditary guild, divided into three classes—the *Fíle* *Dha*, who sung in the service of religion and in war, and were the counsellors and heralds of princes; the *Breitheamhain*, who recited or chanted the laws; the *Seanachaidhe*, who were chroniclers and genealogists to princes and nobles. Their ample privileges and endowments of land gave them an exorbitant influence, which both princes and people had sometimes to rise against and curb. The great skill of the Irish bards on the harp was acknowledged everywhere. After the conquest of Ireland by Henry II., the profession began to sink. Still many of the chiefs maintained bards in their families, whose songs and legends kept up the national feeling. This occasioned several measures of the English rulers against the Irish bards; Elizabeth ordered the bards that were captured to be hanged, as the instigators of rebellion. Turlough O'Carolan, born 1670, died 1737, is reckoned the

last Irish bard; his poems were translated into English by Furlory. Other lays of the bards have been translated by Miss Brooke, *Relics of Irish Poetry* (Dub. 1789), and Hardiman, *Irish Minstrelsy* (Dub. 1831).

The bardism of Scotland may be conjectured to have been similar to that of Ireland; but little is certainly known of the subject beyond the fact that there were poets or bards of different degrees in the Highlands down to the 17th century. In various Scottish enactments from 1449 onwards, bards were coupled with 'sorners' and 'masterful beggars,' as liable to hanging or burning on the cheek.

The name of bard was unknown among the Germanic nations; though a corrupt reading in some MSS. of the *Germania* of Tacitus (*barditus* for *baritus*, 'war-cry') led Klopstock and others to write wild religious and war songs, which they called 'bardeits,' under the notion that they were restoring a branch of the national literature.

Bar-esanes (properly, Bar-Daisan), a Syrian, the 'last of the Gnostics,' was born at Edessa in 154, and died in 222. He diffused his opinions through the medium of hymns, of which he is reckoned the earliest writer in Syria. These hymns, fragments of which are still extant, exhibit a rich and pure fancy. His *Gnosis* was not purely dualistic. He did not consider evil the eternal coefficient of good, but merely the result of a temporary reaction of matter on spirit. Yet, inexplicably enough, he maintained the devil to be a self-existent, independent being. He denied the doctrine of the resurrection of the body, and in conformity with such a conviction, asserted that Christ's body was not real, but only an illusive image brought down from heaven. See Hilgenfeld's *Barthesanes* (1864).

Bardwan', or BARDWAN (but correctly Vardhamāna), a city of Bengal, on the East Indian Railway, 67 miles from Calcutta. In point of architecture, it is a miserable place—an aggregate, as it were, of 73 villages. It contains a palace of the Maharajahs, and a large collection of temples. Pop. (1881) 34,080.—The district of which the above city is the administrative headquarters, has an area of 2697 sq. m., and a pop. (1881) of 1,391,823 inhabitants. It exports silk, rice, tobacco, jute, also iron and coal—the latter chiefly brought from the mines of Raniganj. Since the opening of the East Indian Railway, many small villages have been transformed into thriving centres of trade. The *division* of Bardwan has an area of 13,855 sq. m., and a pop. (1881) of 7,393,454.

Barbone's Parliament, the 'Little Parliament' summoned by Oliver Cromwell, met 4th July 1653, and was so nicknamed from the name of one of its members, Praise-God Barbon or Barbone, a leather merchant. It consisted of 139 persons, 'faithful, fearing God, and hating covetousness,' but mostly of very destructive social principles. These began by abolishing the Court of Chancery, and were proceeding to abolish tithes, to the alarm of the more moderate members, and of Cromwell himself, who dissolved the parliament on 12th December of the same year.

Barèges, a small watering-place in France, in the department of Hautes-Pyrénées, about 12 miles SE. of Pierrefitte railway station. Situated at a height of over 4000 feet above the sea, great part of it is buried in snow throughout the winter, consequently few live here save in summer and autumn. The place consists of but one long dull street and about eight houses, yet as many as 1200 bathers come here every year during the four months' season. The mineral water for which it is celebrated contains principally sulphuret of sodium, with portions of carbonate,

muriate, and sulphate of soda, nitrogen, and sulphuretted hydrogen. Its efficacy in the cure of wounds, rheumatism, stiffness of joints, and scrofulous complaints is said to be very remarkable. The French government has erected here two hospitals for soldiers.

Barèges, mixed tissues adapted for women's dresses, called in France *Crêpe de Barèges*, first manufactured at Luz, in the Pyrenean valley of Barèges, but now principally produced at Bagnères de Bigorre. Barèges are usually a mixture of silk and worsted; an inferior kind being composed of cotton and worsted. They vary in colour, and are sometimes light in tint, with printed patterns. All are of a slight fabric for summer wear.

Ba'regine, a slimy or gelatinous deposit in the hot sulphurous springs at Barèges, Aix-la-Chapelle, and elsewhere, which is found on microscopic examination to consist of masses of rods and filaments of *Beggiatoa* (see BACTERIA) mixed with grains of reduced sulphur. The thermal waters apparently act as culture-fluids for the atmospheric germs, and it is to the vital activities of these fungi that Cohn ascribes the evolution of sulphuretted hydrogen from the spring.

Bareilly, or BAREIL, the chief city of a district in Rohilkhand, North-west Provinces of India, pleasantly situated in a well-wooded country on the Ramganga, 152 miles E. of Delhi. The city, civil station, and cantonments lie on an open plain, and show irregular outline and mean architecture, the private houses being mostly built of mud. Cotton, grain, and sugar are the staples of commerce; furniture and upholstery the manufactures. It is the seat of a college attended by more than 300 students. Bareilly was a centre of disaffection during the Mutiny, but was taken in May 1858. Pop. (1881) 109,844.—The district has an area of 1614 sq. m., contains (1881) 1,030,936 inhabitants, and is bounded on the N. by Tarai, and on the E. by Nepal. (*Rai Bareilly* is a different town, district, and division in Oudh, near Lucknow).

Barentz (or BARENTS), WILLIAM, a Dutch navigator, who acted as pilot in connection with several expeditions which sailed from Holland in search of a North-east passage, and who died off the coast of Nova Zembla, 20th June 1597. The first vessel, fitted out by the city of Amsterdam, sailed from Holland, June 5, 1594, reached the north-east extremity of Nova Zembla, and returned. A second expedition of seven vessels, sent out in the following year, started too late in the season to be successful; the third expedition of two ships, starting in May 1596, reached Spitzbergen, when the two parted. Barentz's vessel, doubling the north-east of Nova Zembla, encountered ice, and unable to sail eastward, turned towards the south. Barentz and his crew were frozen up in Ice Haven on September 1st, where they spent a miserable winter. On 13th June 1597 the crew left these desolate shores in two boats, and Barentz died shortly afterwards. The survivors reached the shores of Lapland, and were rescued. Captain Carlsen found Barentz's winter-quarters undisturbed in 1871, after a lapse of 274 years, and in 1875 part of his journal was recovered by another explorer. The Barents Sea between the European mainland and Nova Zembla, Spitzbergen, and Franz Josef Land, still preserves the name of this brave mariner. See Van Campen's *Barents' Relics* (Lond. 1877).

Barère de Vieuzac, BERTRAND, a French revolutionist and regicide, born at Tarbes, 10th September 1755. First an advocate at Toulouse, he acted as a deputy in the National Assembly, and was sent by the department of the Hautes-Pyré-

nées to the National Convention in 1792. He soon became active as a journalist, and attached himself to the 'Mountain,' supporting it with eloquence of such a flowery and poetical style as afterwards earned him the name of the 'Anacreon of the guillotine.' He was president of the Convention when the sentence was passed upon Louis XVI. He rejected the appeal to the people, and gave his vote with these words: 'The law is for death, and I am here only as the organ of the law.' Though a supporter of Robespierre, he concurred in his downfall, yet this did not save him from being impeached and sentenced to transportation. His sentence was not carried into effect, and he shared in the general amnesty of the 18th Brumaire. Elected a deputy during the Hundred Days, he was banished after the second restoration. He betook himself to Brussels, where he devoted himself to literary work till the revolution of July permitted his return. In the year 1832 he was once more elected as a deputy by the department of the Hautes-Pyrénées; his election, however, was annulled, on account of errors of form, whereupon the government called him to be a member of the administration of that department, which office he continued to hold till 1840. He died on 14th January 1841. His *Mémoires* were edited by Hipp. Carnot (4 vols. Paris, 1842). Barère was one of the most graceful and consummate liars in history. His masterpiece in this kind is his famous account of that glorious suicidal sinking of the ship *Vengeur* in 1794, which is still dear as a heroic story to the French people, and was described in glowing words, as a real historical exploit, by Carlyle in the first edition of his *French Revolution*. See Carlyle's *Miscellanies*.

Barëtti, GIUSEPPE MARC ANTONIO, an Italian writer, born at Turin in 1719, was destined for the priesthood, but devoted himself to literature. In 1751 he established himself as a teacher of Italian in London, where in 1757 he published the *Italian Library*, giving an account of the most eminent Italian authors and their works. He afterwards spent nine years on the Continent, where he published a readable book of travels, and in Venice, under the name 'Aristarco Scannabue,' started the *Frusta Letteraria*, the 'literary scourge,' which was suppressed after the twenty-fifth number. In 1769 he stabbed a Haymarket bully in self-defence, and was tried for murder, but was acquitted—Dr Johnson, Burke, and Garrick testifying to the excellence of his character. He died in London, 5th May 1789. His thirty-six works included an Italian and English Dictionary (1760), which is still popular.—See Birkbeck Hill's edition of Boswell's *Johnson* (1887); and an article in the *Dictionary of National Biography* (1885).

Barfleur, a seaport town of France, in the department of La Manche, about 15 miles E. of Cherbourg. It is now a place of little importance, but it is noteworthy in history as the port whence, in 1066, William the Conqueror set out on his invasion of England. Pop. (1881) 1304. Close by, on the ill-famed *Pointe de Barfleur*, stands the highest lighthouse in France, 271 feet above the sea.

Barfrush. See BALFRUSH.

Bargain and Sale, in the law of England, is a mode of conveyance whereby property, real and personal, may be assigned or transferred for valuable consideration. In England the property of goods passes before delivery by such a sale, as opposed to the executory contract of sale where the passing of the property is postponed. The expression is chiefly important in connection with the conveyance of *real estate*. Such a bargain by the Statute of Frauds must be in *writing*.

No particular form of words is essential to the validity of a bargain and sale; 'bargain and sell' are the words of transfer ordinarily used. The pecuniary consideration is held to be a mere matter of form, and any trivial sum may be inserted in the conveyance. The effect of a bargain and sale not followed by a formal conveyance, was that the seller holds the legal estate for the benefit of the purchaser. The Statute of Uses transferred the legal estate to the purchaser in all such cases, and it thus became possible to convey the legal estate without making formal delivery of the land. To prevent secret conveyances in this form, the Statute of Enrolments enacted that a bargain and sale should not pass a freehold unless made by deed enrolled within six months after its date. Since the date of this statute, bargain and sale has not been used for conveying freeholds, but it is still a common form for conveying estates less than freehold, as a mortgage for a term of years, or the common lease and release. See LEASE AND RELEASE.

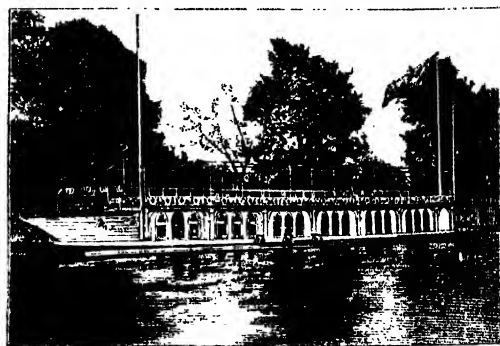
There is no such title to land or other real estate in the Scots law, but in that system there may be a contract as to land, the evidence of which must be in writing, as in holograph missives or tested minute of sale.

In the United States, bargain and sale is a contract to sell land for money or its equivalent, whereupon a use arises in favour of the bargainee to whom the seisin is transferred by force of the Statute of Uses; it is the most common form of conveyance of land in the United States. All things for the most part which may be transferred by deed, may be transferred by this mode of conveyance, and by it an estate in fee for life or for years may be created.

Barga Pass, a hill-pass in the north of Bashahr State, Punjab, leading across the Himalayas. It is the lowest of three passes within a mile's distance, and its highest part is about 15,000 feet above the sea.

Bargé, an ancient town of Piedmont, in the province of Cuneo, 30 miles SW. of Turin, with slate-quarries. Pop. 2074.

Barge, a name applied to vessels of various forms: (1) A pleasure-boat or boat of state, elegantly fitted, furnished with a band of rowers, used on state occasions. The college 'barges' at Oxford are similar boats, but are permanently moored. Such, too, are the 'house-boats' that have come so much into vogue on the Thames of recent years. (2) A flat-bottomed freight-boat, with or



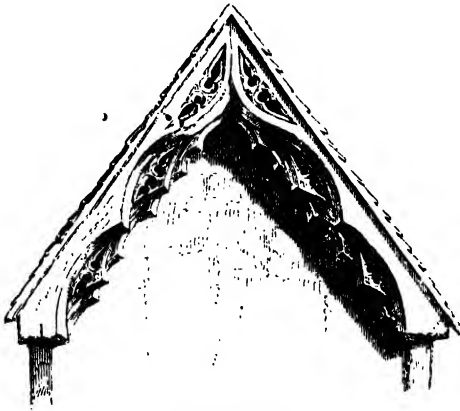
Oxford University Barge.

(From a Photograph by Frith.)

without sails, used on our rivers and canals, either in conveying goods from one town or quay to another, or to aid in bringing stores to and from ships. Barges without sails are often called *lighters*. (3) A long narrow boat belonging to a man-of-war, for

the occasional use of the superior officers. (4) In the United States also, a double-decked passenger and freight vessel, without sails or power, and towed by a steamboat.

Barge-board, a board extending along the edge of the gable of a house to cover the rafters and



Barge-board.

keep out the rain. These barge-boards were often very richly ornamented, particularly in the 14th and 15th centuries.

Barham, RICHARD HARRIS, author of the *Ingoldsby Legends*, was born at Canterbury in 1788. In 1795 he succeeded to the manor of Tappington, and in 1802 he met with an almost fatal coach accident whilst on his way to St Paul's School, an accident that partially crippled his right arm for life. He entered Brasenose College, Oxford (1807), was ordained (1813), and in 1821 received a minor canonry of St Paul's Cathedral, three years later becoming incumbent of a City church, and priest in ordinary of the chapels royal. His first novel, *Baldwin* (1819), fell still-born; his second, *My Cousin Nicholas* (1834), appeared in *Blackwood's Magazine*; and with the commencement of *Beutley's Miscellany* in 1837, he began his series of inimitable burlesque metrical tales under the pen-name of Thomas Ingoldsby. They were first collected into a volume in 1840, and the third series was published in 1847 with a brief memoir of the author by his son. An English adaptation of the old French *contes*, the *Ingoldsby Legends* at once became popular from their droll humour, fine irony, varied and whimsical rhymes, and quaint out-of-the-way learning. His lyrics were published separately in 1881. Barham was a frequent contributor to the *Edinburgh Review* and *Literary Gazette*. He died in London, June 17, 1845. See his *Life and Letters* by his son (2 vols. 1870; 3d ed. 1880).

Bar-Hebraus. See ABULFARAJ.

Bari, a city of Italy, capital of an Italian province, is situated on a peninsula in the Adriatic, on the coast railway, 277 miles SE. of Ancona, and 122 NW. of Otranto. The streets of the old town only are confined and gloomy. Bari is the see of an archbishop, and has manufactures of cotton, silk, linen, and soap. Its quay and roadstead are good, and a brisk export trade is carried on. The massive old castle is of Norman origin. The old church, San Nicola, a noble specimen of the Lombard style of architecture, founded in 1087, contains some interesting monuments and relics. The still older cathedral of San Sabino has been ruined by the barbarous improvements it was subjected to in the last century. It contains pictures by Paul Veronese and Tintoretto.

Pop. (1862) 33,177; (1881) 58,266. Bari, the *Barium* of the Romans, was an important place to the Greeks as early as the 3d century B.C. It was made a *municipium* by Nero, was under the Saracens for some years in the 9th century, and was taken from the Greeks after a three years' siege by the Norman, Robert Guiscard, in 1071. Later it fell to the Pope, but revolted in 1228 to join the cause of the emperor, Frederick II. In 1558 it became part of the kingdom of Naples. — The province of Bari is badly watered, but wonderfully fertile, and produces fruit, wine, oil, and nuts in abundance. Its salt and nitre works are also important. Area, 2280 sq. m.; pop. (1881) 678,148.

Bari, a race of Soudanese negroes on both sides of the White Nile, whose chief town is Gondokoro. They are tall and active, cultivate durra, and keep numerous herds of cattle; but their morale has deteriorated sadly through the influence of slave and ivory traders, and they have become treacherous and bloodthirsty. In the summer of 1871 Baker waged a short war against the Bari, and added their country to the dominions of Egypt. The language of the Bari is nearly allied to that of the Dinka and other languages of the Nile. See Friedrich Müller, *Die Sprache der Bari* (Vienna, 1864).

Bariatinski, ALEXANDER IVANOVICH, PRINCE, a Russian field-marshal, born in 1814, and educated with the future czar, Alexander II. While a young officer in the hussars, some love-passages with a grand-duchess caused his transference to the Caucasus, where his successes against the famous Shamil (q.v.) secured him in 1852 the rank of lieutenant-general. On the accession of Alexander II., he returned to St Petersburg, and in 1856 was appointed to the command of the army of the Caucasus. Three successful campaigns were closed by the storming of Ghunib, and the capture of Shamil. For these services he was made a field-marshal. His health, however, had broken down, and the remainder of his life was passed chiefly abroad. He died in Geneva, March 9, 1879.

Barilla, an impure carbonate of soda, procured from plants which grow in salt-marshes or other places near the sea; it forms a considerable article of commerce, being used in the manufacture of soap and of glass, and for other purposes in the arts. The greatest quantities of barilla are produced in Spain and the Balearic Islands; but the Canary Islands, Italy, and France also contribute a part. It is procured by burning the plants, much in the same way that seaweeds once were largely burned on the coasts of Scotland for kelp. The Spanish barilla is most esteemed, especially that produced near Alicante, where it is chiefly obtained from the *Salsola sativa*, a plant of the natural order Chenopodiaceae. This plant is cultivated in grounds close by the sea, embanked on the side nearest it, and furnished with floodgates, through which the salt water is occasionally admitted. It is cut in September, dried in small heaps, and then burned in a hole in the ground. Other species of *Salsola* (Salt-wort), as *S. tragus* and *S. kali* (the latter, a common native of the shores of Britain), are also burned for barilla, although they yield it in smaller quantity than *S. sativa*. Barilla is made in France from *Salicornia herbacea* or *annua* (Glass-wort), another of the Chenopodiaceae, plentiful also in salt-marshes on the shores of Britain and other parts of Europe. The manufacture of barilla has greatly declined, from the fact that soda can now be made artificially from common salt. See SALT-WORT.

Baring. The firm of Baring Brothers & Co. is one of the greatest financial and commercial houses in the world. The father of its founder was

John Baring, a German cloth manufacturer, who started a small business at Larkbear, near Exeter, England, in the first half of the 18th century. Two of his sons, Francis and John (1730-1816), established in London in 1770 the now existing house.

SIR FRANCIS (1740-1810), born at Larkbear, was deaf from his youth; but receiving a commercial training in the house of Boelun, he overcame all obstacles, and founded a large and successful business. He became a director of the East India Company, and being a staunch supporter of Pitt, was created a baronet by that minister in 1793. He represented Grampound, Chipping Wycombe, and Cadue in parliament from 1784 to 1806. He took an active part in the discussions relative to the Bank Restriction Act of 1797, and wrote on this and other financial subjects. At the time of his death he was reckoned the first merchant in Europe, and had amassed a fortune of nearly seven millions.

SIR THOMAS BARING (1772-1848), eldest son of the above, succeeded his father in the baronetcy. He appears to have taken no active part in the business of the firm, being chiefly remarkable as an admirer and encourager of art. His magnificent collection of paintings was dispersed by public sale after his death in April 1848. His fourth son, Charles Thomas (1807-79), Bishop of Durham, was a strong Evangelical, noted for his piety and personal kindness. His name is honourably associated with the work of church extension in his diocese.

ALEXANDER BARING, brother of the above (see ASHBURTON, LORD).

SIR FRANCIS THORNHILL BARING (1796-1866), son of Sir Thomas, whom he succeeded, was educated at Oxford, where in 1817 he took a double first class. He represented Portsmouth from 1826 till 1865. Under successive Whig governments, he was a Lord of the Treasury, Secretary to the Treasury, Chancellor of the Exchequer, and First Lord of the Admiralty. He was more noted for his business aptitude than as a politician. He was created Baron Northbrook in 1866, and died at Stratton Park the same year. His son, Thomas George Baring, the second Lord Northbrook, was born in 1826, and was successively a Lord of the Admiralty, Under-secretary of State for India, Under-secretary of War, Governor-general of India (1872-76), and First Lord of the Admiralty (1880-85).

THOMAS BARING (1799-1873), brother of the first Lord Northbrook, devoted himself early to commercial pursuits, and also to politics, in which he was a Conservative, thus taking the opposite side to his brother. He entered parliament in 1835, represented the borough of Huntingdon from 1844 till his death, and was offered the Chancellorship of the Exchequer, under Lord Derby in 1852 and 1858. Like the first Lord Ashburton, he had a taste for pictures. He was much more widely known as a partner of the firm of Baring Brothers than as a politician.

In 1885 the then head of the firm, Edward Charles Baring, was raised to the peerage as Baron Revelstoke. The firm is engaged to a large extent in the negotiation of national loans, in exchange and money-broking, in the produce-trade, home and colonial, and in importation and exportation. In 1890 the firm just tided over a severe crisis.


Baring-Gould, SABINE, an active litterateur in widely different fields, was born at Exeter in 1834, of an old Devonshire family. In early life he lived much in Germany and France. Educated at Clare College, Cambridge, he was appointed incumbent of Dalton, Thirsk, in 1869; rector of East Mersea, Colchester, in 1871; and in 1881, rector of Lew Trechard, Devonshire, having also on the death of his father succeeded to the family property there

in 1872. He travelled in Iceland in 1861, and published the results in *Iceland: its Scenes and Sagas* (1862). His most important books are those for which he has drawn upon his wide knowledge of out-of-the-way medieval lore: *The Book of Werewolves* (1865), *Post-medieval Preachers* (1865), *Curious Myths of the Middle Ages* (1866-67), *The Silver Store* (1868), *Curiosities of Olden Times* (1869), and *Legends of Old Testament Characters* (1871). He has written several volumes on Germany, both historical and descriptive, and has made numerous contributions to theological learning, the chief being *The Origin and Development of Religious Belief* (1869-70), a work less lucid than learned; *Lives of the Saints* (15 vols. 1872-77), *Some Modern Difficulties* (1874); *The Lost and Hostile Gospels* (1874); as well as several volumes of practical and pointed sermons, of which perhaps the best are *Village Sermons for a Year* (1875); *The Preacher's Pocket* (1880); *The Seven Last Words* (1884); and *The Trials of Jesus* (1886). One of his most interesting books is his account of Robert S. Hawker, *The Vicar of Morwenstow* (1876). He published a novel, *In Exile Israel*, without much success, in 1870; but of late years he has won celebrity with a series of novels, of which the authorship is an open secret. The earliest, *Mehalah* (1880), is a story of uncommon power—indeed one of the strongest novels of its time—but it is unequal and somewhat extravagant; its successors are *John Herring*, *Court Royal*, *The Gavrocks*, and *Richard Cable*, all stories of no common merit, and the last by some deemed superior even to *Mehalah*.

Baringo, an African lake lying N.E. of the Victoria Nyanza, and half a degree N. of the equator. It is about 20 miles long, lies 3000 feet above the sea, has numerous streams flowing into it, but has no outlet, though its water is fresh. The mountain-scenery around it is striking and very beautiful. It was visited by Mr Joseph Thomson in 1883.

Barita, a genus of large Australian birds, more accurately known by the title *Gymnorhina*, and more popularly as *Piping Crows*. The beak is large, conical, and straight, and its dilated base arches over the forehead. The common Barita (*Gymnorhina tibicen*) occurs in small communities, especially in cleared places, and often near the colonist settlements. It feeds principally on insects, but is said also to devour small birds. Its note is melodious, and the bird can be readily tamed and taught.

Baritone, that species of the human voice which lies between the bass and the tenor, but whose tone character is more allied to the bass. The compass of a baritone voice is from A on the first space of the bass clef to F above the staff; but the principal notes of the voice are from C to E within that compass; and these should possess the energetic character of a bass voice, and, above all, be produced from the chest, excepting perhaps the highest. In former times, the music for this species of voice was written on a staff with the F clef placed on the

third line, thus: . The name baritone is also

given to a small saxhorn in B \flat or C (see SAXHORN).

Barium (sym. Ba, eq. 137) is the metal present in heavy spar (sulphate of baryta) and baryta. It was regarded as a white metal, until the researches of Dr Matthiessen demonstrated that it possesses a yellow colour. As yet, the metal barium has not been obtained in mass, but only as a powder. It decomposes water readily at ordinary temperatures, and exposed to the air, quickly combines with oxygen, forming the oxide of barium, BaO, or Baryta (q.v.), an earth resembling ordinary caustic lime. The sulphide of barium, BaS, is obtained when the

sulphate of baryta, BaSO_4 , in powder is mixed with finely pulverised coal, and the whole being placed in a crucible, is raised to a red-heat in a furnace. The result is, that 4 atoms of the carbon, C, of the coal carry off the 4 atoms of oxygen in the sulphate of baryta as carbonic oxide, CO, whilst the barium united solely with sulphur is left behind as the sulphide of barium, BaS. The *chloride of barium* is prepared by adding hydrochloric acid, HCl, to a solution of the sulphide of barium, BaS, when sulphuretted hydrogen, H_2S , escapes, and chloride of barium remains behind, and on evaporation of the liquid, is obtained in crystals.

Bark. See BARQUE.

Bark. The hard outer covering of any stem is often popularly called bark, or by botanical writers, cortex. But since in ferns this may be merely a thickening of the outer layers of the cellular envelope, into which the fibro-vascular bundles do not enter, while in monocotyledons the protective layer is not merely a hardening of the epidermis and cellular envelope, but may be firmly interwoven by the fibro-vascular bundles, and in fact indistinguishable from the inner portion of the stem, save as a region so to speak mechanically differentiated by exposure, botanists are accustomed to restrict the term bark to the outer portion of the dicotyledonous stem (see DICOTYLEDON), and especially to that of woody

embryonic cells, the so-called *cambium*: the new cells next the inner or woody portion of the bundle develop into a second layer of wood outside the first; in the same way, the new cells next the outer or bast portion of the bundle form a new layer of bast, of course lying within the first (see BAST), and this process being repeated every spring, as many layers of wood and bast tend to be formed. The formation of bast is, however, usually less regular than that of the wood. This growth of the fibro-vascular bundles limits the outer portion of the cellular matrix, or cellular envelope, from the internal portion or pith much more sharply than before; yet the cellular continuity is still kept up, although the intermediate cells become compressed and elongated into radiating plates, the *medullary rays*. And since the cambium elements of the bundles unite to form a continuous cylindrical layer, it is evident that it is in this region of excessively delicate and thin-walled protoplasmic cells that any mechanical force applied to the stem will cause rupture. Unlike the fibro-vascular bundles of ferns, monocotyledons, or even herbaceous dicotyledons, the bast and wood of the fibro-vascular bundles of the perennial dicotyledonous stem are thus readily split asunder; the woody layers inclosing the pith are thus left exposed, while the bast layers of the bundles, with, of course, their external coverings of cellular envelope, cork, and epidermis, are thus peeled off as a hollow cylinder, while the torn cambium covers both separated surfaces with its wet and viscous remnants. Botanists were formerly wont to regard this mechanically or accidentally separated 'bark' as a distinct structure or organ highly characteristic of dicotyledons, and to distinguish its layers as parts of a natural whole, the epidermis and cork, the cellular envelope, and the bast being respectively termed outer, middle, and inner bark, or epi-, meso-, and endophloem; but these useless and confusing terms are now happily abandoned by careful writers, since they are no more of physiological than of morphological importance. The functions of the different layers of bark are, of course, as entirely distinct as is their origin; the protective

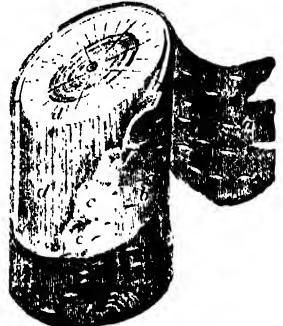


Fig. 2.—Stem of *Laburnum*, showing the layers of the bark: a, layer of cork cells; b, green cellular layer; c, bast fibres with soft test cells and cambium on the inner surface; d, woody cylinder traversed by medullary rays, with cambium cells on its outer surface.

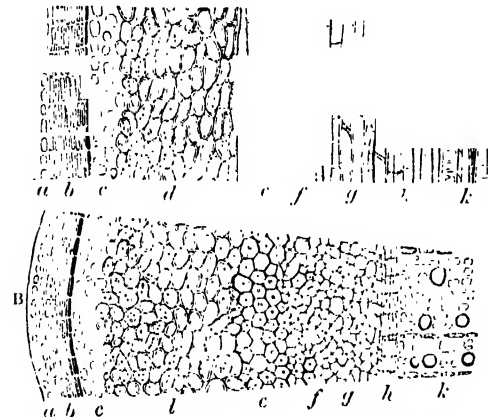


Fig. 1.—A, Longitudinal section of bark of Dicotyledon (Alder):

a, epidermis with cuticle; b, cork cells; c, thickened cells; d, green cellular layer of loosely placed cells containing chlorophyll; e, hard bast fibres; f, thin-walled cells of soft bast; g, vessels with sieve-plates of soft bast; h, cambium; k, wood with fibres and dotted vessels.

B, The same in transverse section.

and perennial stems. In succulent and herbaceous plants, and young shoots of shrubby or herbaceous ones, the stem structure resembles that of lower plants; the epidermis (which may be sooner or later for practical purposes supplemented or replaced by a subjacent layer of cork) protects the green parenchymatous layer, or *cellular envelope*, which performs leaf functions, and is, in fact, continued upwards through the leaf-stalks into the parenchyma of the leaves. Below this layer we come to the fibro-vascular bundles, which lie simply in a loose but anastomosing ring, or rather cylinder, through the meshes of which the external cellular envelope and the internal pith are in direct continuity. When, however, the dicotyledonous stem becomes perennial, its fibro-vascular bundles continue to grow through the combined multiplication of a central layer of persistently

embryonic cells, the so-called *cambium*: the new cells next the inner or woody portion of the bundle develop into a second layer of wood outside the first; in the same way, the new cells next the outer or bast portion of the bundle form a new layer of bast, of course lying within the first (see BAST), and this process being repeated every spring, as many layers of wood and bast tend to be formed. The formation of bast is, however, usually less regular than that of the wood. This growth of the fibro-vascular bundles limits the outer portion of the cellular matrix, or cellular envelope, from the internal portion or pith much more sharply than before; yet the cellular continuity is still kept up, although the intermediate cells become compressed and elongated into radiating plates, the *medullary rays*. And since the cambium elements of the bundles unite to form a continuous cylindrical layer, it is evident that it is in this region of excessively delicate and thin-walled protoplasmic cells that any mechanical force applied to the stem will cause rupture. Unlike the fibro-vascular bundles of ferns, monocotyledons, or even herbaceous dicotyledons, the bast and wood of the fibro-vascular bundles of the perennial dicotyledonous stem are thus readily split asunder; the woody layers inclosing the pith are thus left exposed, while the bast layers of the bundles, with, of course, their external coverings of cellular envelope, cork, and epidermis, are thus peeled off as a hollow cylinder, while the torn cambium covers both separated surfaces with its wet and viscous remnants. Botanists were formerly wont to regard this mechanically or accidentally separated 'bark' as a distinct structure or organ highly characteristic of dicotyledons, and to distinguish its layers as parts of a natural whole, the epidermis and cork, the cellular envelope, and the bast being respectively termed outer, middle, and inner bark, or epi-, meso-, and endophloem; but these useless and confusing terms are now happily abandoned by careful writers, since they are no more of physiological than of morphological importance. The functions of the different layers of bark are, of course, as entirely distinct as is their origin; the protective function of the epidermis even with its cuticle, being insufficient, this is supplemented by the corky layer, which grows continuously from a layer of permanently embryonic cells, the cork cambium (see CORK). The cellular envelope continues to vegetate, more or less actively, so long as any light finds its way through the cork layer, air too finding access through loosened openings of this, the lenticels; while the functions of the bast are more complex, and are separately discussed (see BAST). The tannin and other important principles to which bark so often owes its economic importance, are usually to be regarded from the standpoint of vegetable physiology not as reserve materials, but rather as waste products of the plant's activities, which are either contained in the laticiferous vessels, or deposited in the cellular

envelope and in the cells of the soft bast by the descending sap. The outer layers of thick barks usually crack as the stem expands within; but in the lace-bark tree of the West Indies (*Lagetta lutearia*) the bast fibres separate regularly, and layer after layer may thus be stripped off, showing lozenge-shaped meshes arranged with beautiful regularity.

Bark for Tanning.—The bark of many trees is capable of being used for Tanning (q.v.), but those kinds are usually preferred which are rich in tannin (see TANNIC ACID), although other properties besides the percentage of tannin determine the value of a bark for preparing leather. Oak bark from *Quercus robur* and *pedunculata* are used more than all other kinds in Europe, and contain from 7 to 11 per cent. of tannin; but the barks of willow, larch, Scotch fir, birch, and alder are likewise employed to a considerable extent. That of the Chestnut (*Castanea vesca*) is much esteemed. From both bark and wood of this tree an extract is made in France which is largely used both in tanning and dyeing. In Spain, tanners employ the inner layer of the bark of the cork oak. Three species of oak are used for tanning in the United States—namely, *Quercus tinctoria*, *prinus*, and *falcata*; the former two contain about 6 per cent., and the last 8.6 per cent. of tannin. West of the Rocky Mountains, the bark of the *Quercus densiflora*, which contains 16.5 per cent. of tannin, is preferred. But the bark most used for tanning, both in the States and in Canada, is that of the Hemlock Spruce (*Abies Canadensis*). It contains from 14 to 16 per cent. of tannin. This bark has become so much used for tanning, and its extract for both dyeing and tanning, that the annual production of it in the United States has reached the enormous amount of 1,100,000 tons, while the quantity of oak bark used does not exceed 355,000 tons. Hemlock bark is largely exported from America. The *Acacia decurrens*, a tree indigenous to Australia and Tasmania, yields a bark very rich in tannin, and it has been much used in England. The bark of the *Loropeterygium Lorentzii*, from the Argentine Republic, contains 20 per cent. of tannin, and is very popular as a tanning material in France. Some of the above barks are transported in the form of extracts.

The *barking* of trees can be accomplished with facility only in spring, when the sap has begun to circulate. The tree being felled, the rough external lifeless parts of the bark are removed as useless by means of a sharp instrument called a *scraper*; the smaller branches are cut into lengths of about two feet, and their bark is loosened by beating with a mallet, and easily taken off—as boys at the same season make plane-tree whistles; the bark of the trunk and main branches is cut through by a chisel-like instrument, called a *barking-iron*, into similar lengths, each of which is divided longitudinally, and finally stripped off by the aid of mallets, chisels, &c. The bark is sometimes dried in sheds, being placed on narrow shelves or frames in such a way that there may be a very free circulation of air about it; sometimes in the open air, when it is very generally made to rest in a sloping position against trunks of trees placed horizontally at a little distance from the ground, or against rack-frames of forked sticks with cross-bars. The larger pieces of bark are placed so as to protect the smaller both from sun and rain. Great care is necessary in the drying of bark, as it is much spoiled if allowed to get mouldy, and is liable to suffer injury from rain or from the exposure of its inner surface to the sun. Bark was, and to some extent still is, a very important source of the revenue derived from many woods and coppices; but in numerous dis-

tricts of Great Britain, oak and other coppice-wood is no longer a profitable forest crop, owing to the low price to which bark has fallen.

Uses of Bark by Savage Races.—In the ethnographical collections of many museums will be found some curious applications of bark. Some tribes of North American Indians make their canoes of birch bark, and in British Guiana they are made of the bark of Purple Heart (*Copaifera pubiflora*) and of Locust (*Hymenaea Courbaril*). Of birch bark, the Red Indians also construct baskets, cans, &c. In Sweden it is used as a material for carved boxes, and in Lapland for baskets and shoes. Coats are made in British Columbia from pine bark, and this garment is formed of an elm bark by the Ainos of Japan. In both cases the bark is woven in strips. Some aboriginal races make blankets and various articles of clothing of prepared bark from different trees, which in some cases is thick and woolly, and in others thin and papery. A kind of lace is obtained from the Lace-bark (q.v.) of Jamaica. Paper is made in different parts of the world from the bark of a number of species of trees, but some kinds are used quite locally (see PAPER). At least one aboriginal tribe in Australia form their shields of bark. Bread of birch bark is eaten in North-west America; and in Norway and Lapland, in times of scarcity, of that of elm and pine. One of the most primitive cooking-vessels known is made of bark, and is used by the Shompengs inhabiting the interior of the Great Nicobar.

Bark in Medicine, &c.—The principal barks used in medicine will be found noticed in separate articles. Amongst them may be noted Angostura Bark (*Cusparia*); Cascarella (*Cascarella* Bark, Eleutheria Bark); Cascara (*Sagrada* Bark, Sacred Bark, California Buckthorn Bark); Cinchona (*Cinchona* Bark, Peruvian Bark, Jesuits' Bark, China Bark, Arica Bark, Calasaya Bark, Crown Bark, Condaminea Bark, Loxa Bark, Ledger Bark, Red Bark, Quill Bark, &c.); Cinnamon Bark; Winter's Bark; Witch Hazel (*Hamamelis*); Bebeerine.—When bark is mentioned without any prefix, it is usually Cinchona, otherwise called Peruvian or Jesuits' Bark, that is intended.

The barks used for dyeing, tanning, and other purposes in the arts, being generally named from the trees which produce them, particular references here are unnecessary.

Bark-beetles, a name loosely applied to a number of Coleoptera which devour the bark of trees. Some of them are members of a family known to entomologists as Xylophaga, or wood-eaters. Many beetles eat wood and such substances, but the forms in question are of special

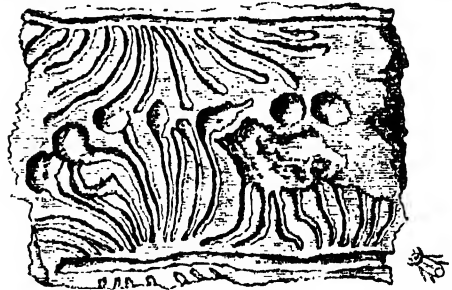


Fig. 1.—Galleries made in Pine-bark by parent (horizontal) and larvae (vertical) of *Tomicus typographus*.

importance as forest pests. The adults are not content, like so many other beetles, with finding underneath the loose bark of trees a safe nursery for their larvae, but bore passages, whence

the larvæ again bore outwards, so doing great damage. Thus the Typographer Beetle (*Tomicus typographus*) bores, pairs, and breeds in the bark of pine-trees, and the larvæ, laid in side recesses, eat their way out laterally, leaving their mark in the form of the curious galleries described by the title 'typographus.' In 1783 this beetle is said to have ravaged the Harz Forest in Germany to the extent of a million and a half of pines, and so revived its popular name of 'the Turk,' by which it is referred to in some old German liturgies. Another Pine-beetle (*Hylurgus pini-perda*) is also a formidable devastator. The maggots develop in recesses from the main tunnel, bore their way through the bark, fly to other trees, and eat into the tender shoots. It is this last habit which is obviously most injurious. The tender bark of the young shoots of the Scotch fir, spruce, larch, &c. is the favourite food of the Pine-weevil (*Hyllobius abietis*), while the maggots form winding galleries in the soft wood under the bark. The Ash-bark Beetle (*Hylesinus fraxini*) is a frequent pest in plantations where thinning and removal of sickly branches is insufficiently attended to. Another common form is the Elm-bark Beetle (*Scolytus destructor*). The female makes a burrow about 3-5 inches long, and lays a hundred or more eggs.

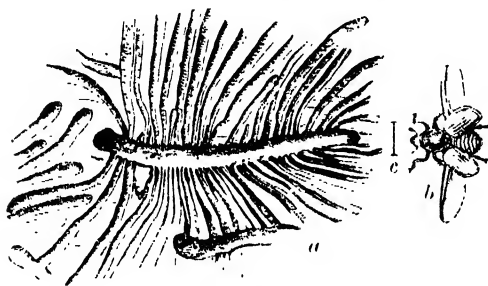


Fig. 2.

a, Galleries made by Elm-bark Beetle (*Scolytus destructor*);
b, the insect, magnified; c, natural size.

The restless grubs bore outwards as usual at right angles to the parent gallery. As a curative device, the outer bark of elms is sometimes removed, with the result of causing a vigorous flow of sap, which in some way or other kills the maggots. For further information as to these frequent and formidable pests, which are of no little practical importance, Miss Ormerod's work on *Injurious Insects* may be consulted. The same work gives an account of some of the necessary precautions of thinning, cleaning, &c., as well as of the curative processes of washing, scraping, and the like. See **BETTER**.

Barker. EDMUND HENRY, classical scholar, was born in 1788 at Hollyn, Yorkshire, and studied at Cambridge. He prepared editions of several Latin classics, a translation of Buttmann's *Greek Grammar*, and numerous contributions to periodicals, particularly to the *Classical Journal*; and during a five years' residence with Dr Parr, he was led to undertake a revision of Stephens' *Thesaurus Lingue Græcæ* (12 vols. folio, 1826). This gigantic work was violently assailed in the *Quarterly Review* by Blomfield, against whom Barker wrote his *Aristarchus Anti-Blomfieldianus* (1818). Barker's *Parriana* (2 vols. 1828-29), and his posthumous *Reminiscences of Professor Porson* (2 vols. 1852), give much information about those two famous scholars, but are ill-digested and not entirely reliable. He lost all that he had in a lawsuit, was obliged to sell his fine library, and was thrown

into a debtors' prison. He died in London, March 21, 1839, in extreme poverty.

Barker's Mill (Fr. *Roue à réaction*, Ger. *Segner's Wasserrad*), a water-wheel invented by a Dr Barker towards the middle of the 18th century.

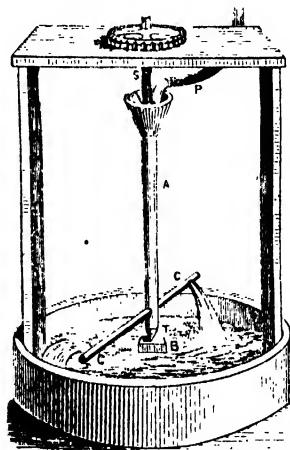


Fig. 1.

It is represented in its simplest or typical form in fig. 1. A is a wide metal pipe, resting at its lower end, by the steel spindle T, on a metal block B, and kept in a vertical position by the spindle S, at its upper end, which passes through the frame of the machine. Near its lower end, two smaller pipes or arms C, C, are inserted, which project horizontally from it, and these have each, at the outer extremity, a hole cut horizontally in them, opening towards opposite sides. The water is supplied from the pipe P. The reaction caused by the water gushing from the arms, forces them backwards, and gives to the whole machine a rotatory motion. Suppose that the arms were closed all round, the pressure of the water against the sides would be proportional to the height of the water in the pipe A, and the pressure against any particular surface of the side would produce no motion of the arm, because an equal pressure is exerted in a contrary direction upon a corresponding surface opposite to it. Now, if one of these surfaces be cut out, the pressure against the other being uncounteracted, forces the arm in the opposite direction to that of the side in which the hole is made. This being done to both arms on opposite sides, two equal pressures are produced, which conspire in generating the same motion of rotation. As soon as motion ensues, centrifugal force comes into play, which, throwing the water out towards the ends of the arms, increases the reaction.

The power is manifestly increased by heightening the water-column, or by lengthening the arms—the former increasing the pressure of the water, and the latter increasing the leverage. In the mill shown in the figure, the column in A cannot be advantageously heightened, for the higher it rises, the greater must be the weight which the conical spindle, T, has to sustain, and the greater, consequently, becomes the friction. Hence, in the reaction-wheels now in use, the



Fig. 2.

original Barker's Mill has been so modified as to allow of the water being conducted from the reservoir below the arms instead of above. The power of these machines may be also increased by using curved (fig. 2) instead of straight arms. See WATER-POWER.

Barking, an irregular straggling market-town of Essex, on the left bank of the Roding, 7 miles NE. of London. It has a fine old church, but scarce any remains of its ancient abbey (founded 670), once one of the richest and most important Benedictine convents in the kingdom. It was burnt by the Danes in 870, but was splendidly rebuilt about the middle of the 10th century by King Edgar. The Abbess of Barking was one of four ladies who held the rank of baroness in right of their office. Market gardening, the manufacture of jute, and fishing give employment to the inhabitants, (1881) 9203 in number. A flotilla of fishing-smacks belongs to the town, their harbour being Barking Creek, at the mouth of the river. Near this point the sewage of the Metropolitan Board of Works empties into the Thames.

Barlaam and Josaphat, one of the most widely-spread religious romances of the middle ages, relating the conversion of the Indian prince Josaphat by the hermit Barlaam, his subsequent resistance of all forms of temptation, and his becoming a hermit. The story, however, has been discovered to be nothing more or less than a Christianised version of the legendary history of Buddha, agreeing with it in all essentials and many details. The very name Josaph is merely the Buddha under another name, the word *Josaph* or *Josaphat* being simply a corruption of the word *Bodisat*. Rhys Davids notes that Josaph is in Arabic written also *Yudasaf*; and this, through a confusion between the Arabic letters Y and B, is for *Bodisatva*, a title of the future Buddha which is constantly repeated in the Buddhist Birth Stories. The Buddhist origin of the romance was first pointed out by Laboulaye in 1859, but was first proved by Dr Felix Liebrecht in 1860. The celebrated theological writer, John of Damascus, who flourished in the 8th century at the court of the calif of Bagdad, and afterwards became a monk, is regarded by many scholars (such as Max Müller, Gaston Paris, and Rhys Davids) as the author or rather translator of the original Greek text, which was first published by M. de Boissonade in the 4th volume of his *Anecdota* (Paris, 1832). M. Zotenberg, in his edition of a French version, published in collaboration with M. Paul Meyer in 1864, expressed the opinion, adopted also by Littré, that the work had probably been composed in Egypt, and that it was anterior to Islamism; but M. Zotenberg has since made out a strong case to prove that the Greek text was edited in Syria in the first half of the 7th century by a monk named John, belonging to the convent of Saint Saba, that it contains traces of the religious controversies peculiar to that time, and that this version has been the source of all the translations and known imitations. Whatever its ultimate origin, this romance quickly became popular, and was translated into many European languages. It exists in Latin, French, Italian, Spanish, German, English, Swedish, and Dutch versions, and was even translated as early as 1204 into Icelandic. In the official *Martyrologium* drawn up by Cardinal Baronius for use in the Western Church, and authorised by Pope Sixtus V. (1585-90), appear, under the date of the 27th of November, 'the holy saints Barlaam and Josaphat of India, on the borders of Persia, whose wonderful acts St John of Damascus has described.' It is impossible to discover at what

precise date their canonisation was first decreed, but they appear in the *Catalogus Sanctorum* of Petrus de Natalibus, who was Bishop of Equilium from 1370 to 1400, and it was from this source that Cardinal Baronius adopted their names into his authorised Martyrology. The name of 'the holy Josaph, son of Abener, king of India,' appears in the corresponding manual of worship in use in the Greek Church under date of August 26. Professor Max Müller points out that Gotama the Buddha, under the name of St Josaphat, is at the present day officially recognised and honoured throughout Catholic Christendom as a saint of the Church of Christ, and adds that 'few saints have a better claim to the title than Buddha; and no one either in the Greek or in the Roman Church need be ashamed of having paid to Buddha's memory the honour that was intended for St Josaphat, the prince, the hermit, and the saint.' See 'Die Quellen des Barlaam und Josaphat,' in Felix Liebrecht's *Zur Volkskunde* (1879); Max Müller, 'On the Migration of Fables,' in vol. iii. of *Chips from a German Workshop* (1880); *Buddhist Birth Stories*, by Rhys Davids (1880); *Notice sur le Livre de Barlaam et Josaphat, accompagnée d'extraits du texte Grec et des versions Arabe et Ethiopienne*, by H. Zotenberg (1886); and J. Haléys article thereon in vol. xv. of the *Revue de l'Histoire des Religions* (Jan.-Feb. 1887).

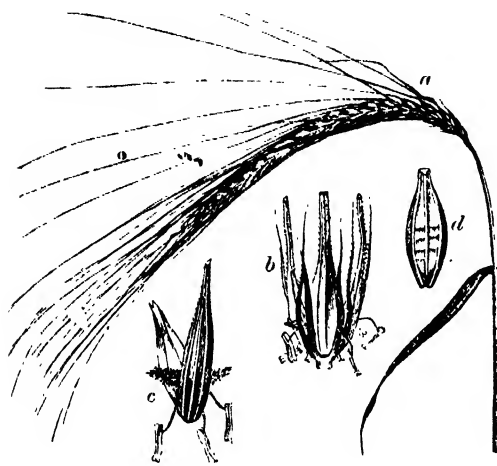
Bar-le-Duc, capital of the French department of Meuse, situated on the river Orain and the Marne-Rhine canal, 158 miles E. of Paris by rail. It manufactures cotton and calicoes, and carries on a considerable trade in timber from the Vosges, for the use of Paris, and in iron, wool, and wine. Bar-le-Duc has a communal college, normal school, theatre, museum, and public library. Its ruined castle, long the stronghold of the Dukes of Bar (Le Barrois), still overlooks the entrance into Lorraine. Pop. (1881) 17,421.

Barletta, a seaport of Italy, on the Adriatic, 31 miles NW. of Bari by rail. It carries on a large shipping-trade with Greece, the Ionian Islands, and other ports of the Adriatic. The town is well built, handsome, and clean; it has a fine cathedral, a colossal statue supposed to represent the Emperor Heraclius, a college, theatre, and castle, formerly one of the most impregnable fortresses in Italy. Pop. (1881) 31,994.

Barley (*Hordeum*), a cereal or grass crop. In ordinary cultivation it is annual, but some hardy varieties are sown in autumn, and except in severe winters, survive and ripen the second year, or if frequently cut green and not allowed to mature seed, may continue to grow for several years. The cultivation of it extends from Italy northwards in Europe. It is better adapted than any other grain to the most northern regions of the grain-growing belt. Some of its varieties are cultivated with advantage where the climate is too cold, or the summer too short, for any other cereal crop. It extends over a wider climatic range than any of the other grains. Barley-meal is used for bread in the north of Europe, but in other parts it is used as a horse-corn, or converted into malt for the making of beer, or deprived of its outer husky covering, and so used as an article of human food called *pot-barley*, or when well rounded and polished in the mill, *pearl-barley*: this is sometimes ground into a fine quality of barley-meal.

By botanists cultivated barley in England is divided into three species. *H. vulgare* (Scotch Bere or Bigg) is distinguished by having the grains in four rows; *H. hexastichum* in six rows; and *H. distichum* in two rows. But the lower part of the spike in the varieties ranked under *H. vulgare*

is often six-rowed, and only the upper part four-rowed; and in rich soils, a tendency to resume the six-rowed form is otherwise manifest. A kind with naked seeds, called *Siberian Barley* (*H. caldest*



Barley:

a, a spike in fruit; b, a cluster of three spikelets in flower, with awns removed; c, a flower with palea; d, a grain (outer side).

of some writers), is cultivated in some parts of Europe, but it is liable to loss in harvest through the grain, which is slightly attached to the straw, shaking off: its straw is regarded as richer food for cattle than that of most other kinds. The *Nepaul* or *Himalaya Barley*, another variety with naked seeds, has been recommended as particularly adapted for cold mountainous regions, yielding good crops in the Himalaya at an elevation of 14,000 feet above the sea.—Of the two-rowed barley there are many varieties, of which the Common or *Early English*, *Golden Drop*, *Big Ben*, *Hallett's Pedigree*, and the *Cherdier* are among the most esteemed, the latter being in particular demand for brewing. The *Sprat* or *Bottle-dove Barley* (*H. zeccriton*) is also two-rowed, but is distinguished by the grains standing out from the spike, their awns spreading very widely. It is sometimes called *German Rice*, as it swells by boiling in the way that rice does, and for some purposes forms a good substitute for it. It is scarcely cultivated in Britain, but is in much esteem in Germany, and succeeds well in the Alps at an elevation of 3360 feet.

H. pratense and *H. murinum* are barley grasses seen in natural British pastures, but are of no practical value.

Barley is most productive where the climate is moderately dry and warm. No country seems to possess a soil and climate better suited to its growth than many parts of Britain. In former times, this grain was largely employed in the British Islands as human food; and is still used in some parts of Ireland, and in the Highlands of Scotland. Fine malting barley always commands a ready demand in the London market, as well as a high price.

Barley occupies a prominent place in the rotation of the lighter class of arable lands, such as in Suffolk and Norfolk. Fine malting qualities are grown on the turnip-soils of these counties, as well as throughout the south-eastern counties, where the four-course rotation is adopted. In this rotation, the barley follows the turnip-crop. The

ground is worked into a fine tilling condition on the surface, and the seed is either broadcast or drilled in February or March, depending on the weather and the condition of the soil, at the rate of two, three, or four bushels to the acre. On strong land or on very rich soils, the barley-crop is sown after a grain crop, say wheat, as it is found to give a better quality, though not such a heavy crop. In the south of England, barley is allowed to stand till the grain is fully ripe, when it is either cut with the scythe or most commonly now with the reaping-machine. In some parts, where the straw is very short and the bulk small, it is not bound up into sheaves, but remains in the swath for a few days, when it is afterwards carted, and stored in barns or oblong stacks. The produce is more influenced by the seasons than that of wheat, as it is liable to suffer from droughts in the early part of the year, and when sown late in very dry seasons, it sometimes remains for weeks and months without germinating, and never comes to a crop. This is all the more striking when it is remembered that if sown under favourable conditions, barley germinates more quickly than any other grain crop, being up within three or four days. On well-farmed land, from 48 to 60 bushels and upwards are got to the acre. In the peaty soils of the fens of Lincolnshire, barley is not raised, as it is too liable to lodge with the rain; neither is it a favourite crop in the moist climate of the west of England.

Barley has long been grown in Scotland. The level parts of the Lothians and other counties in the east of Scotland, with Moray, Inverness, and Ross in the north, are the districts in which the finest crops are raised. In these districts barley is commonly sown after a portion only of the turnip-break. Morayshire barley has long been famous for its fine sample, and is in great demand with English brewers. On the other hand, in the less genial climate of the western counties, and also of the upper parts of Aberdeenshire, Banffshire, and Perthshire, less barley is sown, and oats frequently succeed the green-crops. In these parts the variety known as *bere*, or *bigg*, is preferred to any other, as it is not so liable to lodge, and it withstands wet weather better, and comes earlier to maturity. Bere is the variety which is cultivated by many of the small cotters in the Highlands and islands. Instead of a rotation in which green-crops find a place, a succession of corn-crops is taken, and an occasional rest is given to the soil. The crop, when ripe, is cut by sickle, scythe, or reaping-machine; bound up at once, and put into stooks, to defend it from the weather till ready to cart, and to be built up in neat round stacks. The grain is invariably thrashed out by machinery.

On good turnip-soils the land is enriched by the droppings of the sheep, frequently fed on cake and corn along with the roots, and manure is not often directly applied to the barley-crop. When the turnip-crop is drawn from the land, unless the soil is very rich, the barley should have a dressing of some phosphatic manure, say 3 cwt. or 4 cwt. per acre of superphosphate bone-meal, or fish-guano, at the time of sowing, and 1 cwt. of nitrate of soda after the plant is well up, and the roots spreading through the soil.

Barley-break, an old English country game, originally played by three couples, resembling *Prisoner's Base*. One couple, left in a middle den called 'hell,' had to catch the others, who could break or separate when about to be overtaken. They then changed partners, but when caught, had to take their turn in catching the others. The game is alluded to by Sir Philip Sidney, Suckling, and Herrick. The first half of the name may be from the grain, *barley*, because often played in a

corn-field or barley-field, or it may be *barley* or *parley* (Fr. *parlez*), a common children's term for a truce during a game.

Barleycorn, JOHN, a personification of the spirit of barley, or malt-liquor, often used jocularly, and in humorous verse. This usage is comparatively ancient. Dr Murray's Dictionary quotes a title in the Pepysian Library, about 1620, 'A pleasant new ballad . . . of the bloody murder of Sir John Barleycorn.' Burns's ballad on John Barleycorn, 'There was Three Kings into the East,' is well known, and more popular than the verse deserves.

Barley-sugar, a confection prepared with sugar and a decoction of barley.

Barlow, JOEL, an American poet and politician, born in 1755 at Reading in Connecticut. He studied at Dartmouth and Yale Colleges, and was intended for the profession of the law, but served as a military chaplain during the War of Independence. In 1787 he published a poem called *The Vision of Columbus*, which abounds in beautiful passages, but is overburdened with political and philosophical disquisitions, and disfigured by singularities of expression. Barlow came to England in 1788 as agent for a land company, but finding that he was merely a tool of swindlers, he threw up his post, went to Paris, where he signalised himself by zealous republicanism; published in 1792 in London a poem entitled *The Conspiracy of Kings*; and endeavoured also to work upon the public mind in England by political pamphlets. In autumn 1792 he was deputed by the London reformers, with whom he was associated, to proceed to Paris, where he received the rights of French citizenship. He was one of the commission sent by France for the organisation of Savoy. He spent some years on the continent of Europe in political, literary, and mercantile pursuits, in which he made a fortune, and served for a short time as American consul at Algiers. He returned to America in 1805, and was appointed ambassador to France in 1811. He died, 22d December 1812, near Cracow, when on his way to a conference with the Emperor Napoleon at Vilna. In his later years he was gathering materials for a history of the United States. His *Columbiad* (1807), at which he laboured for half a life-time, and the germ of which was contained in his *Vision of Columbus*, is an historical review of events from the time of Columbus to the French Revolution. Other works are his intemperate *Advice to the Privileged Orders* (1791-95), and the would-be humorous poem, *Hasty Pudding*, poor stuff spite of its popularity. See Todd's *Life and Letters of Joel Barlow* (1886).

Barm. See YEAST.

Barmecides, or BARMEKIDES, a Persian family descended from Barmak, a physician and priest of Balkh, in the province of Khōrasan, the cradle of the greatness of the Abbaside califs, under whom the Barmecides rose to the highest offices in the state. Khālid bin Barmek became prime-minister of Abul Abbas Al-Saffah, the first Abbaside calif; and his influence enduring through the reigns of Al-Mansur and Al-Mahdi, the latter intrusted him with the education of his son, the celebrated Haroun Al-Raschid. The virtuous and able Jālyā, the son of Khālid, was made vizier by Haroun upon his accession to the califate in 786, and both by his military skill and civil administration contributed largely to the prosperity of the reign. Under his four sons, Al-Fazl, Ja'afar, Mohammed, and Musa, the house rose to a pitch of power and splendour still more dangerous for a subject in the East than in the West. Al-Fazl and Ja'afar especially were virtual rulers of the great empire, which stretched from

Mauritania to Tartary, and were widely celebrated for a splendid magnanimity and generosity that completely eclipsed the calif. Their downfall was sudden, terrible, and infamous, and stains the great monarch's name with a blot that will never be washed away. After a convivial evening spent in different pavilions, at dead of night the calif sent for Ja'afar's head, and ordered Yāhyā and Al-Fazl to be flung into prison at Bagdad. According to the historian Al-Tabari, the whole Barmecide family, men, women, and children, numbering over a thousand, were slaughtered with scarce an exception. The motives for this atrocious massacre have never been adequately explained. The popular idea is that given in the *Arabian Nights*. The calif took such delight in Ja'afar's conversation that he desired his companionship even in the harem, and therefore married him *pro forma* to his eldest sister, the beautiful Abbāsah. Ja'afar bound himself by a solemn oath to be his wife's husband in name only, but failed to keep the compact, and the consequences of his folly brought upon his head the merciless wrath of the offended calif. Some have hinted besides at a taint of heresy, or at least tolerance of heretics, that may have angered the soul of Haroun 'the orthodox.' The only conclusion we can come to is that of Al-Mas'udi: 'As regards the ultimate cause' (of the catastrophe), 'it is unknown, and Allah is Omniscient.' Sa'id ibn Sālim, the grammarian, wrote: 'Of a truth, the Barmecides did nothing to deserve Al-Raschid's severity, but the day (of their power and prosperity) had been long, and whatso endureth long waxeth longsome.' The calif sincerely repented his enormous crime. From that day he never enjoyed refreshing sleep—he would have given his crown to bring Ja'afar back to life. Nor did the kingdom thrive after the extermination of this wise and enlightened family. Though the calif had forbidden mention of their name on pain of death, he could not save his ears from hearing their praises, the constant recurrence of which must ever have added a fresh sting to his penitence. The story, 'full of the waters of the eye,' as Firdousi says, took a strong hold upon the Moslem imagination, and has been told and retold a thousand times. See sec. iii. of the 'Terminal Essay,' in vol. x. (1886) of Sir Richard F. Burton's *Thousand Nights and a Night*.

BARMECIDE'S FEAST, an imaginary banquet, from the story in the *Arabian Nights* of one of the Barmecide family who put a series of empty dishes before a starving beggar, giving them magnificent names one after another as he did so. The beggar entered into the humour of his host, making as if he were eating heartily, and at last even getting so much flustered with his imaginary wine as to give him a good box on the ear, whereupon the prince, delighted with the poor fellow's patient humour, set a real dinner before him at once.

Barmen, a busy town in the district of Dusseldorf, Rhenish Prussia, extending in the beautiful valley of the Wupper for about 4 miles from close to Elberfeld almost to Langenfeld. It consists of a group of villages and three chief parts now connected together—Upper, Middle, and Lower Barmen—which united form the town of Barmen. Nowhere in Germany is so much manufacturing industry accumulated in a single spot. Barmen is the principal seat of the ribbon-manufacture on the Continent. Its fabrics go to all parts of the world. It produces linen, woollen, cotton, silk, and half-silk ribbons, cloth of various kinds, stay-laces, and thread. It has also considerable manufactures of soap, candles, metal wares, buttons, machinery, and pianofortes. There are, besides, in the valley, numerous bleach-fields and Turkey-red dye-works. Its workmen number

20,000, and the annual value of its manufactures is as much as £6,000,000. Barmen is a great missionary centre, and possesses the mission-house and seminary of foreign missions belonging to the Rhenish Missionary Society. Most of its inhabitants (in 1871, 74,947; in 1880, 95,941; in 1885, 103,066) are Protestants—only 15,000 being Catholics.

Barmouth, a picturesque and popular watering-place, in the county of Merioneth, Wales, at the mouth of the Maw, 10 miles W. of Dolgelly, and 230 miles NW. of London. Opposite, across the river, is Cader Idris, 2914 feet high. Pop. 1512.

Barnabas, St. (properly **JOSES**), mentioned in the Acts of the Apostles as a fellow-labourer of Paul, and even honoured with the title of apostle. He is also supposed to have founded the first Christian community at Antioch. According to tradition, he became the first Bishop of Milan, but Ambrose makes no mention of him among the bishops who had preceded him in that see. He is variously reported to have died a natural death, or to have suffered martyrdom in Rome, Alexandria, or Cyprus, in 61 A.D. His festival is celebrated in the Roman Catholic Church on June 11.

The Epistle ascribed to him bears the strongest internal evidence of being an Alexandrian forgery of the 2d century. This Epistle contains twenty-one chapters, the first four and a half in a Latin version, the rest in the original Greek. Its aim is obviously to strengthen the faith of believers in a purely spiritual Christianity. It commences by declaring that legal sacrifices are abolished, and then proceeds to show, though not in a very coherent or logical manner, how variously Christ was foretold in the Old Testament. In the tenth chapter, it spiritually allegorises the commands of Moses concerning clean and unclean beasts; in the fifteenth, it explains the 'true meaning' of the Sabbath; and in the sixteenth, what the Temple really prefigured. This concludes what may be termed the doctrinal portion of the Epistle; the remainder, which is of a practical character, describes the two ways of life—the way of Light and the way of Darkness, and closes with an exhortation that those who read it may so live that they may be blessed to all eternity. It is a simple, pious, and earnest work; but makes a far more judicious use of the New Testament than of the Old. It was ascribed to Barnabas by Clement Alexandrinus and Origen, and it is found in the *Codex Sinaiticus*; while its authenticity, if not its authorship, was admitted by Eusebius and Jerome. It is now usually dated early in the 2d century. The best editions are those of Hilgenfeld (2d ed. 1877) and Gebhardt-Harnack (2d ed. 1876).

Barnabites, a congregation of regular canons of St Paul, founded at Milan in 1530, and sanctioned by Pope Clement VII. two years later. They were so called because the church of St Barnabas in that city was granted them to preach in. Their special duties were—to attend the sick, to preach, to instruct the young, and to take the charge of souls. They soon established themselves in Italy, France, Austria, and Spain, and enjoyed the privilege of teaching theology in the schools of Milan and Pavia. Many eminent men have been sent forth by them. Besides the three usual monastic vows, they took a fourth—not to sue for church preferments. In France and Austria they were employed in the conversion of Protestants. They have now only about twenty monasteries in Italy and Austria, with their chief house at Rome. They were expelled from France in 1880.

Barnacle, a common crustacean, technically known as *Lepas*, and belonging to the group of stalked Cirripedia (q.v.). Like the closely allied sessile acorn-shell, a barnacle may be said to be a

crustacean fixed by its head, and kicking the food into its mouth by its legs. So much are they disguised, however, in their fixed state, that they were formerly referred to the class of molluscs. Careful examination of the adult or inspection of the young

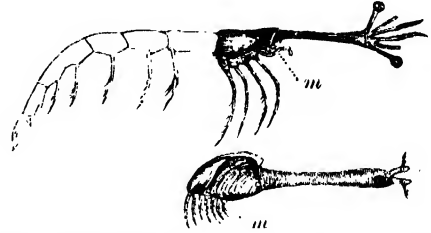


Fig. 1.—Comparison of normal Crustacean type with the degenerate condition of Cirripedes (after Darwin):

The shaded portions correspond. Note the arrested development of the abdomen, and the marked degeneration, though not decrease, of the anterior head region, which forms the barnacle stalk; *m*, mouth.

form at once demonstrates the really crustacean character of the animal. Though the barnacle is very markedly distinguished from the acorn-shell in the development of a fleshy and contractile stalk, the general structure is very much the same (see ACORN-SHELL). There is the same complex valved shell, the same six pairs of waving thoracic

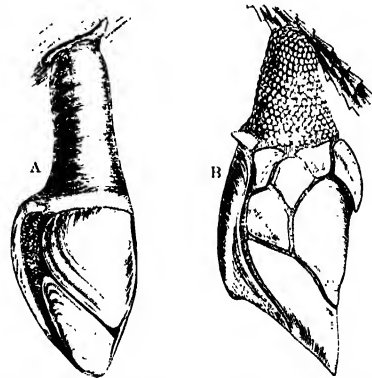


Fig. 2.—A, *Lepas bilii*; B, *Scalpellum rostratum* (after Darwin).

legs, the same cement-gland aiding by its secretion to effect attachment, the same hint of degenerate antennae on the fixing surface, and so on. Like most of the Cirripedia, barnacles are hermaphrodite, while some nearly related forms exhibit minute, almost exclusively reproductive, 'complemental' males in close association with the normal hermaphrodites, or with females.

What has been already noted in regard to the life-history of acorn-shells, applies equally to barnacles. Little *Namptis* (q.v.) larvae escape from the egg-cases, and after moulting several times, pass into a second stage, like such water-fleas as *Daphnia* or *Cypris*. The first pair of appendages become suckorial, and after a period of free-swimming, the pupa settles down on some floating object, mooring itself at first by means of its antennary suckers, but rapidly becoming glued by the secretion of the cement-ducts. After fixing, important changes in structure and position speedily occur, the valved shell is developed, and the perfect adult form gradually assumed. The food consists of small animals swept to the mouth by the curled waving legs. Growth is somewhat rapid, but the

skin-casting of the adult is, except in one genus, much restricted. Neither the valves nor the uniting membrane, nor that forming the stalk, are moulted, but the surface gradually disintegrates and is removed, perhaps sometimes in flakes,

(*Enten-muschel*), somehow led it to be regarded as the young stage of the barnacle goose. The bird is in size smaller than the common wild goose,

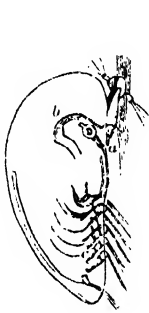


Fig. 3.—Attached Pupa of *Lepas australis* (after Darwin):

The central duct, *b*, running to antennae, *a*.

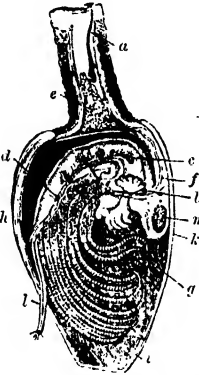


Fig. 4.—Structure of *Lepas*, after removing right shell and integument (after Darwin).

a, eye; *b*, central duct; *c*, vas deferens; *d*, vas deferens; *e*, ovary; *f*, oviduct; *g*, thoracic legs; *h*, carina; *i*, tergum; *k*, scutum; *l*, cirrus or penis; *m*, muscle.

whilst new and larger layers are formed beneath. The commonest species, *Lepas anatifera*, is sometimes 16 inches in length, but most of this goes to the stalk.

The stalked Cirripedia have a world-wide distribution, especially, however, in the warmer seas. Nearly half of the Lepadidae are attached to floating objects, and are therefore peculiarly cosmopolitan. Some species are able to bore (*Lithotrypa*), and more than one form has been found on shark, turtle, or whale. The stalked cirripedes are much more ancient than the sessile Balanidae, their golden age dating back to the cretaceous period. The history of knowledge in regard to the barnacle is a striking illustration of progress. While the early naturalists, such as Gerard (1597), abandoned themselves to the citation of popular myths, according to which the barnacle was the young form of a goose (see BARNACLE GOOSE), the animal became at a later date the object of serious but not exhaustive study, and was referred to the Mollusca, or regarded as intermediate between them and Crustacea; while within the last fifty years the discovery of the life-history has made the position of these interesting forms entirely intelligible, and the monograph of Darwin has furnished an approximately complete diagnosis of all the forms known in 1857. Subsequent research has only been an amplification and corroboration of his classic work. Apart from their occurrence on ships, floating timber, &c., the stalked cirripedes have little practical interest, except that a few forms (*Pollicipes*) are, like some of the acorn-shells, big and dainty enough to be eaten. See ACORN-SHELLS, CIRRIPEdia; Darwin's Ray Society Monographs; and Max Müller's *Science of Language* (2d series), for the myth of the barnacle goose.

Barnacle (or **BERNICLE**) **Goose** (*Anser bernicla* or *Bernicla leucopsis*), the bird which the natural history of former days gravely represented as deriving its origin from a crustacean—the barnacle. In the middle ages, during what has been well called the period of mythical zoology, the enigmatical structure of the barnacle (*Lepas anatifera*), known in Germany as the 'duck-mussel'



Barnacle Goose.

being a little more than 2 feet long, and about 5 lb. in weight. The bill is somewhat longer than the head, the wings long and pointed, the tail short and rounded, the black and white plumage very prettily marked. It is a common winter visitant of the western coasts of Britain and of Ireland, and retires in spring to its home in more northern regions, where it breeds, vast numbers passing northward along the coast of Norway to the Arctic Ocean. It is highly esteemed for the table.

The Brent Goose, or Brent Barnacle (*Anser* or *Bernicla brenta* of some naturalists), has frequently received the name of barnacle goose, and no little confusion has thus arisen. It is a smaller bird with much darker plumage, remarkable for length of wing and powerful flight, and for its distant migrations. It is at home in high northern latitudes, but occurs as a common winter bird of passage in the United States and Canada, as also in Britain and on the continent of Europe. It is excellent for the table.

Very nearly allied to these species is the Red-breasted Goose, or Red-breasted Barnacle (*Anser ruficollis*), a beautiful bird, of which the neck and upper part of the breast are of a rich chestnut red. In size, it resembles the brent goose. It is a very rare visitant of Britain and of the continent of Europe, and is abundant only in the extreme north of Asia.—Another species called Hutchins' Goose or Barnacle (*A. hutchinsii*), of dark plumage, and with a triangular patch of white on each side of the head and neck, is abundant in Hudson Bay and the extreme north of America. The limits of the genera *Anser* and *Bernicla* are rather dubious. See GOOSE.

Barnard, HENRY, an American educationist, born in 1811 at Hartford in Connecticut, studied at Yale College, travelled in Europe, and became in succession school commissioner of Rhode Island, of the Normal School in Hartford, president of St John's College at Annapolis in Maryland, and, in 1867, commissioner of education at Washington. By his *American Journal of Education*, he did much to promote the best interests of his country by guiding the public mind on educational questions. His works on his chosen subject are numerous and important; among them are *Pestalozzi and Pestalozzism* (New York, 1861), and *Education* (2 vols. Lond. 1878-79).

Barnard, LADY ANNE, author of 'Auld Robin Gray,' was born in 1750, eldest daughter of James Lindsay, fifth Earl of Balcarres. In 1793 she married Andrew Barnard, a son of the Bishop of

Limerick, and colonial secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived till 1807, when, losing her husband, she returned to London, her residence till her death on 6th May 1825. Her matchless lyric, named after the old Balcarres herd, was written as early as 1772 to sing to an ancient melody; but she first acknowledged its authorship in 1823 to Sir Walter Scott, who two years later edited it for the Bannatyne Club, with two continuations—poor, as such mostly are. See the Earl of Crawford's *Lives of the Lindsays* (1849).

Barnard Castle, a market-town in the county of Durham, on the left bank of the Tees, 15 miles W. of Darlington by rail. On a rocky height over the river are the ruins of a castle built in 1112-32 by Barnard Baliol (q.v.), ancestor of John Baliol, king of Scotland, who was born in the castle, and founded an almshouse in the town. Barnard Castle is the scene of part of Scott's *Rokeby*. Near it is an art museum, French Renaissance in style, presented to the town in 1874 by the Countess Montalbo, in which are many of the art treasures formerly in Streatham Castle. Pop. (1851) 4357; (1881) 4544.

Barnardo, THOMAS J., F.R.C.S.E., founder of the 'Barnardo Homes' for homeless children, had his attention first turned in this direction by the condition in which he found a boy in a ragged school in East London in 1866. Following up the subject, he began to rescue children who had found their only shelter at night under archways, or in courts and alleys. These were introduced to his homes, where they received an industrial training, were saved from a possible career of crime, and enabled to achieve an honourable position in life. In 1887 over 10,000 boys and girls had been so reclaimed; at the same time Dr Barnardo had under his direction 33 separate institutions in the United Kingdom and the colonies, including an immigration depot in Ontario, an industrial farm in Manitoba, a home for babies, and a hospital for sick children.

Barnaul, a town of Western Siberia, in the government of Tomsk, about 290 miles SSW. of that town. Situated on the Obi, it is the centre of mining and smelting industries in Western Siberia, contains the largest furnaces of the Altai, and has a busy population of 14,000. The town has a school of mines.

Barnave, ANTOINE-PIERRE-JOSEPH-MARIE, a notable figure in the French Revolution, born at Grenoble, October 22, 1761. He early attracted attention as an eloquent pleader in the parliament of Grenoble, and was sent as the deputy of his province to the States-general in 1789. Here his trenchant logic, keen wit, and vehement eloquence on behalf of public liberty quickly brought him to the front. He opposed the absolute veto, carried through the confiscation of church property to the use of the nation, the emancipation of the Jews, and the abolition of the religious orders, and was mainly instrumental in the liberation of the slaves and reorganisation of the colonies. He became the idol of the people, particularly after his victory over Mirabeau, in the question of the power of peace and war, which Mirabeau wished to remain with the king, and Barnave successfully claimed for the National Assembly. After the flight to Varennes, he was deputed to conduct the royal family back to Paris, and this duty he discharged with a fine courtesy to the unhappy queen. Subsequently he advocated more moderate courses, defended the inviolability of the king's person, and resisted the assertion of the assembly of its power to remove ministers. This led to his being regarded as a renegade from the national

party, and to his being assailed by the fierce vituperations of the journalists. He retired to his native place on the dissolution of the National Assembly; but after the 10th of August 1792, he was impeached for an alleged treasonable correspondence with the court, and was brought to Paris, tried before the Revolutionary Tribunal, condemned, and guillotined on the 29th of November 1793. Barnave was the second orator in the Constituent Assembly. His manner was grave, very lucid, but somewhat cold. At the close of one of his greatest triumphs, Mirabeau thus characterised him: 'I have never before heard him speak so well, so clearly, and so long; but there is no divinity in the man.'

Barnes, ALBERT, an American theologian and celebrated biblical expositor, was born at Rome, state of New York, on 1st December 1798. He had thoughts at first of devoting himself to the study of law, but eventually prepared for the ministry at Princeton theological seminary. He had charge of a church in New Jersey, and was minister of the first Presbyterian church of Philadelphia, from 1830 to 1867, when he resigned on account of failing eyesight. He was a thoughtful and eloquent preacher. At one time he was tried for heresy, the charge being based mainly on some passages in his notes to Romans, but he was acquitted. He afterwards attached himself to the New School branch of the Presbyterians, and was a strong opponent of slavery. He is best known by his *Notes* on various parts of the Old and New Testaments, specially adapted for the use of Sunday schools and Bible classes, which have had an extraordinary circulation. These *Notes* are distinguished less by original critical power, than for their plainness, simplicity, and directness. He died at Philadelphia, 24th December 1870; a short time previously he had completed a new edition of his *Notes* on the New Testament (6 vols. 1871-72). He issued besides many volumes of sermons, an introduction to Butler's *Analogi*, *Evidences of Christianity*, and some Sunday-school manuals.

Barnes, WILLIAM, perhaps the first of English purely pastoral poets, was born in the vale of Blackmore, of an old Dorsetshire stock that had once owned land, February 22, 1800. Spite of early difficulties, he acquired remarkable learning, and after some time in a solicitor's office, taught a school at Dorchester with success. After obtaining a university degree and receiving ordination, he took the curacy of Whitcombe in 1847, from which he passed to the rectory of Winterbourne Came in 1862. Meantime he had been making himself widely known by his fine idyllic poetry in the Dorsetshire dialect, 'the bold and broad Dorset of England.' His first volume appeared in 1844; the second, the well-known *Homely Rhymes*, in 1859; the third in 1862; the three were collected together in 1879, and published as *Poems of Rural Life in the Dorset Dialect*. These poems reveal straightforward simplicity and sincerity of style, with rare imaginative insight into the simple joys and sorrows of country life. But his sympathetic affection for the human life that 'clothes the soil' is paralleled by his patience in observing the quiet life of nature, and his power of reproducing artistically for others the impression it makes upon the mind. The sweet air of southern England blows through every stanza he writes, and has had a charm of quite singular influence on thousands who have seen Dorsetshire but with the inward eye. His verses are none the less completely artistic that the art is all unconscious, and none the less completely beautiful that the representation of man and nature in them is within its limits completely true. His world was the secluded vale of Blackmore; and its humble

folk, with all their quaintness and humour, he has photographed with absolute truth, though with the instinct of the artist he has chosen as subject of poetic treatment only such episodes as are in themselves beautiful. There was nothing of Crabbe in his poetical equipment, and it need not be objected to a particular poet that he had eyes only for the pathos and beauty of country life, none for its squalor and misery. 'His verse is sometimes deficient in lyrical *sic*ing, as is apt to be the case when descriptive poetry is written in the dancing measures, which are too entirely emotional for work so calm and contemplative as the nature poetry of the English country.' Barnes made himself well known also by his chivalrous attempt to preserve the purity of the mother-tongue. His *Outline of English Speech-craft* (1878) is an attempt to teach the English language in purely English words. His tenses are 'time-takings,' adjectives are 'mark-words of suchness,' degrees of comparison are 'pitchmarks;' and sentences like 'these pitchmarks offmark sundry things by their sundry suchnesses' make large demands upon the reader's ingenuity. He wrote several works of value on philological subjects, and kept up an active interest in the progress of English scholarship almost till his death at the ripe age of eighty-six, October 1886. See the *Life* by his daughter, Mrs Baxter (1887).

Barnet, a town in the south of Hertfordshire, mostly on a hill-top, 11 miles to the NW. of London. Pop. (1881) 4095. Formerly a place of importance on the great northern coach-road, it has still large cattle-fairs. Here in 1471 was fought the famous battle of Barnet between the Yorkists and Lancastrians, in which the latter, after a desperate struggle, were routed, and their leader, Warwick, 'the king-maker,' killed, by which event Edward IV. was firmly established on the throne. A commemorative obelisk is now erected near the spot.

Barnett, JOHN, composer, born at Bedford, 15th July 1802, and for some time musical director of the Olympic Theatre, is known as the composer of *The Mountain Sylph* (1834), *Fair Rosamond*, *Farinelli*, and other operas, besides vaudivilles and songs.—His nephew, JOHN FRANCIS BARNETT, born in 1838, studied at the Royal Academy of Music, and at Leipzig. His works comprise *The Ancient Mariner*, a cantata (1867), *Paradise and the Peri* (1870), *The Raising of Lazarus* (1870), *The Lay of the Last Minstrel* (1871), and *The Good Shepherd* (1876).

Barneveldt, JAN VAN OLDEN, Grand Pensionary of Holland, who played a great part in the long struggle with Spain, was born at Amersfoort in Utrecht in 1547, and in 1569 commenced practice at the Hague as an advocate. He early showed great ardour in the cause of the independence of his country; and as advocate-general of the province of Holland (1585), he proved equally his insight into affairs and his address in diplomatic management. Through Barneveldt's influence Prince Maurice succeeded his murdered father as stadtholder; but Barneveldt it also was, who, becoming head of the republican party, opposed the warlike tendencies of Maurice, concluded (1609) a truce with Spain, and prevented the States-general from joining the revolt of the Bohemians. His influence excited the House of Nassau to still greater jealousy, which in the religious controversies between the Remonstrants and Gomarists degenerated into the bitterest hostility (see ARMINIUS). To oblate a civil war, Barneveldt proposed an ecclesiastical assembly, which resulted in agreeing to a general toleration in respect of the disputed points. The States at

first concurred in this wise measure; but the intrigues of the Orange party brought about a change of views, by representing the Remonstrants as secret friends of Spain. Barneveldt, who sympathised with the more tolerant principles of that party, was attacked in scurrilous publications, and was insulted even in the meeting of the States by the mob, with whom Maurice was an idol. The strife between the Remonstrants and Gomarists became hotter every day, and threatened to end in civil war. In 1618 Barneveldt was illegally arrested, along with Grotius and Hoogerbeets, and thrown into prison. In the following November Maurice procured the summoning of the Synod of Dort, which condemned the Remonstrants with the utmost rigour and injustice. In March 1619, while the Synod was still sitting, Barneveldt was brought to trial before a special commission of twenty-four judges, who condemned as a traitor the innocent man to whom his country owed its political existence. It was in vain that his friends and relations raised their voice; Maurice was not to be moved. On May 13, 1619, the venerable man of 71 years of age mounted the scaffold, and laid down his head with the same firmness that he had shown through all the events of his life. His two sons were at the same time dismissed from office. Four years after their father's death they took part in a conspiracy against the life of the prince, which, however, was discovered. The elder escaped to Antwerp, the younger was seized and beheaded. See Motley's *Life of Barneveldt* (2 vols. 1874).

Barnfield, RICHARD, born at Norbury, Shropshire, in 1574, was educated at Brasenose College, Oxford, and died, a country gentleman, at Stone, in Staffordshire, in 1627. His three little volumes of pastoral poetry, quaint, rhythmic, dainty, but over-luxuriant, cloying with too much sweetness, appeared in 1594, 1595, and 1598. The last contained the ode, 'As it fell upon a day,' and the sonnet, 'If Musique and sweet Poetrie agree,' which, printed by Jaggard in the *Passionate Pilgrim* (1599), were long attributed to Shakespeare. There are complete editions of his poems by Grosart (1876) and Arber (1882).

Barnsley, a manufacturing town in the West Riding of Yorkshire, on the river Dearne, 10 miles S. of Wakefield, and 15 N. of Sheffield by rail. Standing high, in the midst of a rich mineral district, it has manufactures of linen, iron, steel, and glass, bleaching and dye works, &c. Besides ample railway communication, it has the advantage of a canal. The county court was built in 1861; and in the same year a pretty public park of 20 acres was given to the town. Barnsley was incorporated as a municipal borough in 1869. Pop. (1851) 13,437; (1881) 29,789; (1891) 35,427.

Barnstable, a port of entry, with coasting and fishing trade, in Massachusetts, U.S., situated on the south side of Barnstable Bay, 65 miles SE. of Boston. Pop. (1880) 4242.

Barnstaple, a town of Devonshire, on the right bank of the tidal Taw, 6 miles from its mouth, and 39½ NW. of Exeter by rail. The Taw is here crossed by a 13th-century bridge of 16 arches, which in 1834 was widened by iron-work on either side. Owing to the silting up of the river and harbour, much of the trade of Barnstaple has been transferred to Bideford. It has manufactures of lace and pottery. Barnstaple has existed since the reign of Athelstan, who built a castle here. The poet Gay was educated at the grammar-school, a pre-Reformation chapel. The parish church is of 14th-century date; and there are a town-hall (1855), an Albert memorial tower (1863), &c. Till 1885 Barnstaple returned two members to parliament. Pop. (1861) 10,743; (1881) 12,282; (1891) 13,058.

Barnum, PHINEAS TAYLOR, American showman, was born at Bethel, Connecticut, July 5, 1810. His father was tailor, farmer, and tavern-keeper in turn. At thirteen young Barnum was employed in a country store; and about five years afterwards, went largely into the lottery business. When only nineteen, he married clandestinely, and then moved to Danbury, where he edited *The Herald of Freedom*, and was imprisoned 60 days for a libel. In 1834 he removed to New York, where hearing of Joice Heth, the reputed nurse of General Washington, he bought her for 1000 dollars, and with the aid of wholesale advertising, exhibited her to considerable profit. He continued in the show business from 1836 to 1839, but reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until in 1841 he bought Scudder's American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and monkey, a whit negress, a woolly horse, and finally, a noted dwarf (Charles S. Stratton, of Bridgeport), styled General Tom Thumb, whom he exhibited in Europe in 1844. In 1847 he offered Jenny Lind 1000 dollars a night for 150 nights, and received 700,000 dollars—the concert tickets being sold at auction, in one case as high as 650 dollars for a single ticket. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which a clock-factory—made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises, and made another fortune. In 1866 he stood as a candidate for a seat in congress, but was unsuccessful. His *Autobiography* (1854, since greatly enlarged) has the merit at least of frankness. In 1865 he published *The Humbugs of the World*; in 1869, *Struggles and Triumphs*; and in 1883, *Money-getting*. In 1868 he relinquished the business of showman, resuming it, however, in 1871, when he organised a museum, menagerie, circus, &c., which required 500 men and horses to transport it through the country. For his hippodrome in New York he purchased for £33,000 from Messrs Sanger, London, in 1874, a duplicate of the whole plant for the pageant 'Congress of Monarchs.' His 'Greatest Show on Earth' requires 100 railway cars for its conveyance. In 1879 he estimated the number of his patrons up to date as 90,000,000. In 1882 a day's receipts for his Great Show in Boston amounted to over £3000. The elephant 'Jumbo,' purchased in 1882 from the London Zoo, for £2000, was killed in 1885; and in 1887 Barnum's menagerie was destroyed by fire. In 1889 his show appeared at the Olympia in London. He died 7th April 1891, worth \$5,000,000.

Baroche, PIERRE-JULES, a French politician, born at Paris, November 18, 1802. He was elected in 1847 to the Chamber of Deputies, and was made Procureur-général. In March 1850 he became Minister of the Interior, and a decided Bonapartist. He was appointed Minister of Foreign Affairs in 1860, and Minister of Justice and Public Worship in 1863. He died October 29, 1870.

Baroda, the second city of Guzerat, and third in the Presidency of Bombay, capital of the territory of the Guicowar (Gäekwar) in the state of the same name. It is 248 miles N. of Bombay, with which it is connected by railway. It stands to the east of the Viswamitri, which is here crossed by four stone bridges, one of which is of singular construction—an upper range of arches resting on a lower one. It has several palaces, Hindu and other temples, contains the chief court of the state, a high-class school, and two vernacular schools. The majority of the houses are mean and overcrowded. Baroda occupies an

important position between the coast and the interior, and the trade is considerable. Pop. (1881) 101,818.—The Mahratta state of Baroda, the political control of which in 1875 was transferred from Bombay to the government of India, includes the territories of the Guicowar in various parts of the province of Guzerat. Area of these territories, 8570 sq. m. (larger than Wales). The northern districts, which form a wide plain, are drained by the Nerbudda, Tapti, Mahi, and other rivers. The soil is fertile here; ruined temples, deserted towns, and tanks half filled with mud, are a witness of former prosperity. A military force of about 3000 is maintained. In the northern division there is a famous breed of large white cattle; grain, cotton, opium, tobacco, sugar-cane, and oil-seeds are the chief agricultural products, and grow luxuriantly. The Guicowar, Malhar Rao, installed in 1871, was deposed by the British government for obvious misrule (1873-75) and a suspected attempt to poison the British resident, and another member of the Baroda family was, in 1881, appointed in his stead. Pop. (1881) 2,185,005, of whom 1,852,868 were Hindus, 174,980 Mohammedans, 46,718 Jains, and 8118 Parsees.

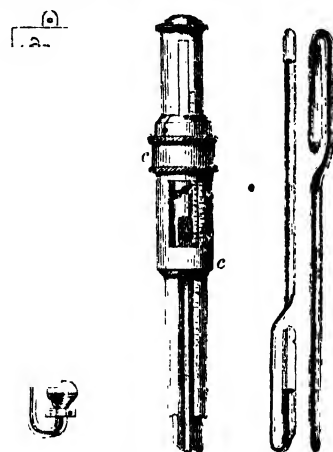
Barometer (Gr. *baros*, 'weight,' and *metron*, 'a measure'), an instrument for measuring the weight or pressure of the atmosphere, invented in 1643 by Torricelli (q.v.). The term is generally understood to refer to one in which the measure is the height of a column of liquid sustained by atmospheric pressure. The fundamental principle of the construction of the barometer is best shown in the experiment which led Torricelli to the discovery of the pressure of the air. A glass tube, about 33 inches in length, open at one end, is completely filled with mercury, and, being firmly closed by the thumb, is inverted and placed vertically in a cup containing mercury. When the thumb is removed, the mercury sinks in the tube till it stands, generally, about 30 inches above the level of the mercury in the cup, leaving in the upper part a space free of air, which receives the name of the Torricellian vacuum (fig. 1). The mercury within the tube being thus removed from the pressure of the air, while that in the cup is exposed to it, the column falls, till the pressure at the section of the whole, in the same plane as the surface of the mercury in the cup, is the same within and without the tube. A similar experiment is seen when, in a U-shaped tube, having one branch much wider than the other, a column of mercury in the narrow branch balances a column of water nearly 14 times as high in the other. In the Torricellian experiment, we have the air and the space occupied by it taking the place of the wide water branch of the U-shaped tube, and the glass tube and mercury forming the narrow branch, as before; the narrow branch, however, in this case being closed above, to prevent the air from filling, as it were, both branches. In both cases, the heights of the columns are inversely as the specific gravities of the liquids of which they consist; and as air is about 10,000 times lighter than mercury, we should have the aerial column 10,000 times 30 inches high. It will be found, under ATMOSPHERE, that from the air lessening in density as it ascends, the height is considerably greater. Any changes that take place in the density of the aerial column will be met by corresponding changes in the height of the mercurial column, so that as the latter rises or falls, the former increases or diminishes. We have, then, in this simple tube, an infallible index of the varying amount of atmospheric pressure, and, in fact, a perfect barometer. The changes, however, are indicated on a scale at least 10,000 times diminished, so that the variations in the tube show very considerable changes in the weight

of the atmosphere. If water be used instead of mercury, the water column would be 14, or, more correctly, 13.6 times as high as the mercurial column, or about 34 feet; and the scale on which the changes take place would be correspondingly magnified, so that a water barometer should be much more delicate than a mercurial one. Water is, however, exposed to this serious objection, that its vapour rises into the empty space above, and causes by its elasticity a depression of the column, the depressions being different for different temperatures. At zero, Fahrenheit, for instance, the depression thus arising would be half an inch, and at 77°, more than 1 foot. It would be doubtful, likewise, at the time of any observation, whether the space referred to was filled with vapour of the elasticity corresponding to the observed external temperature or not, so that the necessary correction could not with certainty be made. The vapour of mercury, on the other hand, at 77° F.—a temperature considerably above the average—produces in the barometer a depression of only $\frac{1}{10,556}$ of an inch, an amount practically inappreciable. After 200 years of experience and invention, we have yet no better index of the pressure of the atmosphere than the simple mercurial column of Torricelli, and in all exact observations it is, in one modification or another, taken as the only reliable standard.

Simple as the barometer is, its construction demands considerable care and experience. It is of the first importance that the mercury to be used is chemically pure, otherwise its specific gravity and fluidity are impaired, and the inside of the tube becomes coated with impurities in such a way as to render correct observation impossible. Mercury as usually sold, is not pure; and before being employed for barometers, must be shaken well with highly dilute but pure nitric acid, to remove extraneous metals and oxides. The same object is effected more thoroughly by keeping it several weeks in contact with the dilute acid, stirring every now and then. After either process, the metal must be thoroughly washed with distilled water, and dried. In filling the tube, it is essentially necessary to get the column free from air and moisture. To effect this, the mercury, after filling, is boiled in the tube, so that air and moisture may be expelled, partly by the heat, and partly by the vapour of the mercury. This process demands great experience and skill, but the same end may be more easily and as effectually attained by boiling the mercury, in the first instance, in an atmosphere of carbonic acid, and then pouring it into the previously heated tube by a filler reaching to the bottom of it. Such care is only expended on the best instruments; ordinary weather-glasses, not needing to be quite accurate, are more simply filled. Notwithstanding all these precautions, minute bubbles of air may manage to keep secreted, and creep up in the course of time into the Torricellian vacuum. To obviate this risk of error, an air-trap is recommended by which any air that may accidentally find its way into the tube, or may be left in it, is arrested in its ascent to the top, and any damage to the instrument averted.

Barometers are usually divided into two classes—cistern barometers, and siphon barometers. The simplest form of the cistern barometer is that shown in fig. 1, which only requires to be set properly in a frame, and provided with a scale, to make it complete. Fig. 2 presents another form of that class, being that generally seen in weather-glasses or ordinary barometers. The tube is bent at the bottom, and the cistern is merely an expansion of the lower end. Very generally, the cistern is hidden from view, and protected from

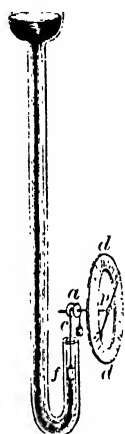
injury by a wooden cover in front. There are two causes of inaccuracy in cistern barometers—one being the capillarity, which tends to lower the



Figs 1, 2, 3, 4, 5.

column; and the other being the difference of level in the cistern caused by the fluctuations in the tube, which renders the readings on the fixed scale at one time too great, and at another too small, according as this level rises above or falls below the original level, or zero-point, from which the scale is measured. The effect of capillarity may be avoided by using tubes of more than half an inch in bore, in which the depression becomes so small that it may be left out of account. In smaller tubes it is estimated from tables constructed for the purpose. Wide tubes have the additional advantage, that atmospheric changes are seen earlier in them than in narrow tubes, there being less friction in the wider than in the narrow. With reference to the error of level, it must be borne in mind that the height of the column sustained by the atmosphere is always to be reckoned from the surface level of the mercury in the cistern. The larger the capacity of the cistern compared with that of the tube, the less becomes this error; for then a very considerable rise or fall in the tube, when spread over the surface of the cistern, makes only a slight difference of level. Care should then be taken to make the cistern as large as possible. The barometer in which the error of level is completely obviated, is that invented by Fortin, which, from its being in every respect the most perfect cistern barometer, deserves particular notice. The cistern, and the lower portion of the tube of this barometer, are shown in fig. 6. The cistern is made of boxwood, with a movable leather bottom, *bb*, and a glass cylinder is inserted into it above, all except the glass being encased in brass. In the bottom of the brass box a screw works, on the upper end of which the leather rests, so that by the sending in or taking out the screw, the bottom of the cistern, and with it the cistern level of the mercury, can be raised or depressed at will. A small ivory pin, *p*, ending in a fine point, is fixed to the upper frame of the cistern; and when an observation is made, the surface of the mercury is made to coincide with the point of the pin as the standard level or zero-point from which the barometric column is to be measured. The tube of the barometer—the upper part of which is shown in fig. 3—is inclosed in one of brass, which has two directly opposite slits in it for showing the height of the column, and on the sides of these the graduation is marked. A

brass collar, *cc*, slides upon the tube with a Vernier (*q.v.*), *vv*, marked on it for reading the height with great exactness, and in which two oblong openings are cut, a little wider than the slits in the



brass tube. When a reading is taken, the collar is so placed that the last streak of light is cut off by the two upper edges of the openings, or until they form a tangent to the convex mercurial curve. By this means, the observer is sure that his eye is on a level with the top of the column, and that the reading is taken exactly for this point. This is the contrivance usually adopted to prevent the error of parallax, or that caused by the eye being slightly above or below the top of the column, by which the scale and the top of the column are projected too high or too low, the one upon the other, as the case may be. The only other arrangement worthy of mention for effecting the same object is that by Weber, who etches the scale on a piece of silvered glass placed over one side of the tube; and when the mirror and tube being vertical the image of the eye appears along with the vertex of the column, the eye is in the same horizontal line with it. Fortin's barometer is generally arranged so as to be portable, in which case the screw, *s*, is sent in until the mercury fills very nearly the whole cistern, by which the air is kept from entering the tube during transport, the leather yielding sufficiently at the same time to allow for expansion from increase of temperature. It packs in a case, which serves as a tripod when the instrument is mounted for use. On this tripod it is suspended about the middle, swinging upon two axes at right angles to each other, so that the cistern may act the part of a plummet in keeping the tube vertical—the position essential to all correct measurements.

The siphon barometer consists of a tube bent in the form of a siphon, having the same diameter at the lower as at the upper end. Fig. 7 represents a simple form of it. The tube travels along the board on which it is placed by passing easily through fixed rings or collars of brass. A scale, divided in inches and parts of an inch, is fixed on the upper part of the board; and when an observation is taken, the tube is adjusted by the screw, *s*, working below it, so that the top of the lower mercurial column

may be on a level with the fixed mark, *a*, or the point from which the fixed scale is measured. In the best forms of the siphon barometer, both tube and scale are fixed, the latter being graduated upwards and downwards from a zero-point near the middle of the tube, and the height of the column is ascertained by adding the distances from it of the upper and lower levels. The siphon barometer is in some respects a more perfect instrument than the cistern barometer. In the first place, the bore at the upper and lower ends of the tube being the same, the depression arising from capillarity is alike for both, and the error from this cause disappears in taking the difference of the heights. In the second place, since the final reading is got from a reference to both upper and lower surfaces, the error in the cistern barometer produced by the different capacities of the tube and cistern is effectually avoided. On the other hand, the taking of two readings, one for each column, is a serious addition to the labour of observation, and means also additional risk of error. Gay-Lussac's siphon barometer (fig. 4) is bent near the bottom, so as to allow of the lower branch being placed in the same straight line as the upper one—a position highly favourable to accurate observation. When constructed for transport, the tube at the bend is narrowed, as in the figure, to a capillary width, which effectually excludes the air; and when the tube is inverted (fig. 5), being the position in which it is carried, the mercury is nearly all held in the longer branch. Such a tube when mounted, like Fortin's barometer, makes an excellent travelling instrument, and is comparatively light, from the small quantity of mercury it contains (see ANEROID).

The wheel barometer, originally invented by Hook, and generally seen as a hall or parlour ornament, has nothing to recommend it as a trustworthy instrument. Fig. 8 shows the main features of its construction. It is essentially an ordinary barometer, like the siphon barometer below, but having a cistern above, to increase the amount of variation in the lower branch. A small piece of iron or glass, *f*, floats on the open surface, and a thread is attached to it, and passed over a small wheel, *a*, fixed to a horizontal axis, to which it is kept tight by a small weight, *c*, hanging at the other end. A pointer, *p*, is fixed to the other extremity of the horizontal axis, which moves to the right or left of the dial, *dd*, according as the mercury falls or rises in the lower branch. The great sweep which the index takes, as compared with the comparatively minute variations of the mercurial column, is the only merit of this instrument. It is easy to see, that with so much intervening between the mercury and the index, the chances of error from hygrometric variations, friction, and other causes are very considerable.

The correction of the barometer for temperature is essential. Mercury expands $\frac{1}{1000}$ of its bulk for every degree of Fahrenheit's thermometer; if, then, a barometer stands at a height of 30 inches when the temperature of the whole instrument is 32° , it will stand at $30\frac{1}{10}$ if its temperature be raised to 69° . This increase of the length of the column by the tenth of an inch is not due to any increased pressure, but solely to the expansion of the mercury under a higher temperature. In order, therefore, that all observations may be compared correctly with each other, the observed heights are reduced to what they would be, if the temperature of the whole instrument with its contained mercury was at 32° . The rule for reduction is very simple: Multiply the number of degrees above or below 32° F. by the observed height, divide the product by 9990, and subtract or add the quotient from or to the observed height for the reduced height. Tables for this purpose have been published by the Royal Society, from which the corrections are found at once.

The variations of the barometer are both periodical and irregular. Periodical variations are those taking place at stated and regular intervals, and irregular, such as have no regular period of recurrence. Perhaps the only truly periodical variation is the daily one, which varies from about 0.150 to 0.001 inch. In most regions of the globe there is also a well-marked annual variation, widely different for different regions. Accidental variations give a range of about 4½ inches. The lowest hitherto observed is 27.333 inches, reduced to sea-level, at Ochertyre, Perthshire, on January 26, 1884 (see ATMOSPHERE); and at Barnaul, in Siberia, a pressure of 31.630 inches was recorded on December 16, 1877, where the temperature on that day fell to -54.4°.

The uses of the barometer may be classified into physical, hypsometrical, and meteorological. It is of essential use in all physical researches where the mechanical, optical, acoustical, and chemical properties of air or other gases are dependent on the pressure of the atmosphere. Its use in hypsometry, or the art of measuring the heights of mountains, is very valuable. When a barometer is at the foot of a mountain, the pressure it sustains is greater than that which is at the top by the weight of the column of air intervening between the top and bottom. A formula of considerable complexity is given by mathematicians for finding approximately the true height of a mountain from barometrical and thermometrical observations made at its base and summit, the interpretation of which does not come within the compass of this work. The following rules give very nearly the same result: (1) Reduce the mercurial heights at both stations to 32° F. (2) Take the logarithms of the corrected heights, subtract them, and multiply the result by 10,000, to give the approximate height in fathoms of the upper above the lower station. (3) Take the mean of the temperature at both stations, take the difference between this mean and 32, multiply the difference by the approximate height, and divide the product by 435. This last result is to be added to the approximate height, if the mean temperature is above 32, and subtracted, if below, to find the true height in fathoms.

The best known use of the barometer is as a meteorological instrument or as a weather-glass. Opticians sometimes attach to certain heights of the barometer particular states of weather, and at certain points of the scale the words 'Rain,' 'Changeable,' 'Fair,' &c., are marked; but the connection thus instituted is very misleading. All who would examine carefully the connection of barometric heights with changes of the weather, must discard entirely the use of these terms, seeing that it is not the actual height of the barometer at any place, but this height as compared with that of immediately surrounding regions, which indicates the weather and the strength of wind accompanying it. Several elaborate codes of rules have been drawn up to serve as a key to the variations, but as these are more or less of a local and hypothetical character, they would be here out of place. Generally speaking, a falling barometer indicates rain; a rising barometer, fair weather. A steady barometer foretells a continuance of the weather at the time: when low, this is generally broken or bad and when high, fair. A sudden fall usually precedes a storm, and the violence of the wind is in proportion to the barometric gradient. An unsteady barometer indicates unsettled weather; gradual changes, the approach of some permanent condition of it. The variations must also be interpreted with reference to the prevailing winds, each different wind having some peculiar rules. The connection between changes of weather and the pressure of the atmo-

sphere is by no means well understood. One or two points may, however, be stated. Since, as has been shown by Dalton, moist air is lighter than dry air, the barometric column will read relatively low wherever a large amount of aqueous vapour has displaced a part of the drier air. The south and south-west winds, which are, in Western Europe, more than any other, the rain-bringing winds, are warm and moist winds. Now, a column of such air, to be of the same weight as one of cold dry air, must be higher; but this cannot occur in the atmosphere, for no sooner does the warm moist column, by its lightness, ascend to a height where the pressure of the surrounding air is less than its own, than it ceases to rise farther, and thence flows over as an upper current in the directions where pressure is less. It follows that pressure is relatively low over any region where for the time the air is moister and warmer than in adjoining regions. On the other hand, the northerly and easterly winds, being comparatively cold and dry, are accompanied with fair weather and a high barometer. The rain attendant on a low barometer, as well as the fine weather accompanying a high barometer, are in a considerable degree to be regarded as the necessary concomitants of our geographical position--of our having the land to the east, and the ocean, with its large evaporating surface, to the west of us. In Great Britain a high and rising barometer frequently accompanies east winds with a drenching drizzle. On the La Plata River, on the other hand, matters are often the reverse of what they are with us; for there the cold south-east wind, coming from the ocean, brings rain with a high barometer, and the land winds, heated by the plains of South America, maintain fine weather with a low barometer. That the temperature, as well as the moisture of the air, is an important cause of the changes of the barometer, is also shown by the fact that, in the tropics, where the variations of the temperature are slight compared with the temperate zones, the barometer experiences almost no change; and also that the region of lowest mean barometer in Asia in summer is not the region of largest rainfall, but the region of highest temperature. See the standard works on Meteorology, such as the books by Blanford, Buchan, Kaemtz, Loomis, and R. H. Scott.

Barometz, or Tartarian or Scythian Lamb, the prostrate stem of a fern (*Aspidium barometz*) which grows in the salt-plains near the Caspian Sea. It is shaggy with yellow silk down, from which the ancients are said to have woven costly garments. The hairy covering, and a rough resemblance to an animal, seem to have formed the basis of the extraordinary opinions which were current in Russia and elsewhere, as late as a century ago, in regard to this fern. It was believed to be at once plant and animal, to grow on a stalk, but yet to have head, eyes, ears, and limbs like a lamb, to eat grass, and in other marvellous ways to show forth 'the glory of the Creator to whom all things are possible' (Herberstein, 1563). The word is an erroneous form of the Russian *baranetz*, diminutive of *baran*, 'ram.' Erman (*Travels in Siberia*, vol. i. p. 111) supposes that these fables simply originated from embellished accounts of the cotton-plant. The red viscid juice is sometimes used as an astringent.

Baron, a term originally derived from late Lat. *baro*, 'a man,' acquired, like *homo*, under the feudal system, the meaning of a vassal, 'homage' (*hominium*) being the ceremony by which the vassal became the man of his lord. By the 13th century in England the highest class of the king's tenants-in-chief, all of whom were holders of several knight's fees, had come in a more restricted sense

to be called barons, the term sometimes including earls and spiritual lords, besides those who were barons and nothing more. Barons possessed a civil and criminal jurisdiction, and were liable, or entitled, to take part in the general council of the nation. The provisions of the Great Charter show that in the time of King John a distinction was recognised between two classes of barons; the right of the 'barones majores' being secured to a personal summons to parliament, along with the archbishops, bishops, abbots, and earls; while the other tenants-in-chief of the crown were summoned generally by the sheriff. This personal summons became the means of defining who were great barons; and in the course of time the right to it came to be regarded as hereditary, a quality thoroughly established in the reign of Edward I. The term baron came more and more to mean the holder of a seat in the House of Lords; the existence of territorial barons, who had no seat in parliament, passed out of mind; and the word baronage came to be regarded as an equivalent for the peerage generally, members of the higher orders of the peerage being all barons. Barons who were such in virtue of their summons were known as barons by writ; and their baronies were inherited by heirs male and female. When parted between two or more co-heiresses, such a barony falls into abeyance, until one, or the sole heir of one of the co-heiresses only survives. It is held that the crown can at any time terminate the abeyance in favour of one of the co-heirs. The creation of barons by patent, first introduced in the reign of Richard II., made the dignity personal, the patent limiting the succession to it. John de Beauchamp of Holt, the first baron by patent, was created Baron of Kidderminster by letters-patent, dated 10th October 1387, to himself and the heirs-male of his body. It was not till the twenty-fourth year of Henry VI. that the practice of creating barons in this way became general; but the creation of barons by writ has now been long discontinued, except in the case of the eldest son of a peer of a higher grade, who is occasionally summoned to parliament in right of his father's barony.

In Scotland, as in England, the term baron at first included all crown vassals—but it came in the course of time to be applied in a more restricted way to such of them as had had their lands erected by the king in *liberum baroniam*. The whole barons, even in the wider sense of the word, were, theoretically at least, under the obligation to attend the council of the nation. By the less considerable landholders (even such as were in this stricter sense barons) this obligation was felt a grievous burden, and doubtless it was not very rigidly enforced. A statute of James I. in March 1427-28 enacted that the 'small barons' should be excused from attending parliament, provided they sent two or more wise men from each sheriffdom to represent them. Though this act was a failure in its main object, the introduction of parliamentary representation (which was not actually established till 1587), it seems to have afforded a quasi-sanction to the habitual absence from parliament of all but the largest landowners. The hereditary title of lord of parliament, first introduced in the 15th century, was in Scotland by no means correlative with the status of baron, it being but a small proportion of the holders of charters of barony who were invested with that dignity. About the end of the 16th century, lords of parliament began occasionally to be styled 'barones majores' in contradistinction to other holders of these lands by barony, who were 'barones minores'; and when, with the more intimate intercourse between the two countries, something like the English idea of peerage sprang up in Scotland, the position of the former was

accounted analogous to that of English barons; their proper designation, however, continuing to be lords, not barons, as distinctly recognised even after the Union of 1707 had put them in possession of all the privileges of peers of England, except the right to sit in parliament and on the trial of peers.

Down to the Restoration the English barons had no coronet, but wore crimson velvet caps turned up with ermine, and at an earlier date, scarlet caps turned up with white fur. Charles II. assigned to them for coronet a circlet of gold, having six large pearls set on it, of which four are seen in the cut, the cap being of crimson velvet guarded with ermine with a gold tassel. The mantle of state is scarlet, with two doublings of ermine. In 1665, when the coronets of the peers of Scotland were assimilated to those of England, a royal warrant extended the use of this coronet to Scottish lords of parliament.



Scottish barons (not lords) had in virtue of their charters of barony very extensive rights of jurisdiction, civil and criminal, including 'pit and gallows,' power over life and limb: the gallows-hill is still an object of interest near some baronial mansions. That jurisdiction might be exercised either by the baron himself or by his bailie. Act 20 Geo. II., chap. 43, reduced the jurisdiction of a baron in civil matters to the right of recovering from vassals and tenants the feu-duties and rents of their lands, and of compelling them to perform the services to which they were bound; he could also entertain civil questions generally when the amount did not exceed 40s. His criminal jurisdiction was at the same time restricted to the power of inflicting a fine of 20s. for assaults. This limited jurisdiction soon fell into desuetude. The same statute further provided that no future charter of barony should confer any higher jurisdiction than the power to recover rents, cultures, and will services. Some Scottish peers of higher title sit in the House of Lords as barons of the United Kingdom; thus the Duke of Argyll sits as Baron Sundridge.

The judges in the Court of Exchequer (q.v.) were from a very early period called Barons of Exchequer. The name probably meant no more than *men*, chief men, of exchequer. The parliamentary representatives of the Cinque Ports (q.v.), who sat in the House of Commons till 1831, were also called barons.

In Germany, the term baron originally meant, as it did elsewhere, a tenant-in-chief of the crown; but its signification, instead of having become restricted, as in England, has become extended. The greater barons, or dynasty-barons, who had seats in the estates of the realm, were all in the earlier part of last century elevated to higher titles. Every descendant of the Knights of the Holy Roman Empire, who ranked among the lower nobility, now takes the style of baron; and a large number of those so designated are barons in virtue of a diploma from some reigning prince, the title being used by all the descendants of the patentee.

In France, very few barons belonging to the old noblesse remain; most of the titles of baron now enjoyed, date from the First Empire or the Restoration. A very few were creations of Louis-Philippe. French barons bear, by way of augmentation, a sinister canton in their arms.

Baron and Femme, or FEME, are Norman-French words, used in English law to denote Husband and Wife (q.v.). See also MARRIAGE. The words are also used in Heraldry to designate the bearing by which the arms of husband and wife

are carried per pale, or marshalled side by side on the same shield (the husband's being on the dexter side).

Baronet, a hereditary title which, etymologically signifying a little baron, seems to have originated in a misapprehension of the derivation of the word Banneret (q.v.), sometimes called in Latin *baronetus*. This dignity was instituted by James I. in 1611, avowedly for the defence of the new plantation of Ulster, but really to replenish the king's exchequer, and was bestowed by letters-patent. The recipient of it was to be a gentleman of coat-armour for at least three descents, with a clear revenue of £1000 from lands. His patent specified his precedence as before all knights, including Knights of the Bath, and such bannerets as were not made in the field in presence of the king: the style was given him of Baronet, and the prefix 'Sir' before his name, while his wife was to have a precedence corresponding to his own, with the style of 'Lady,' 'Madame,' or 'Dane.' Each baronet came under an obligation to maintain thirty soldiers in Ireland for three years, at the rate of 8s. per day for each, the wages of a year being paid into exchequer on the passing of the patent. The sum thus exacted, with the fees of honour due to the officers, exceeded £1000 on each patent. It was stipulated that the number of baronets should not exceed 200, and that on the extinction of a baronetcy, no other should be created to fill up the vacancy. The original baronets were among the most considerable landed gentlemen in England, the first being Sir Nicholas Bacon of Redgrave, Suffolk, Knight, whose patent is dated 22d May 1611, and whose descendant is still the premier baronet. All the original patents were granted to the recipient and the heirs-male of his body. King James never exceeded the 200, except by five creations in room of five baronets who were elevated to the peerage: but his successors disregarded the restriction, and the number became unlimited. The qualifications regarding birth, estate, &c. have not been rigidly adhered to

in later times, though it is still required that each baronet, before his patent be issued, shall be certified by the proper authorities to be a gentleman of coat-armour. In 1612 a dispute for precedence between baronets and the younger sons of viscounts and barons was decided by the king in favour of the latter; and it was at the same

time directed that baronets might bear in their shield of arms, in a canton or inescutcheon, the arms of Ulster, argent, a sinister hand erect couped at the wrist gules—the 'bloody hand' (fig. 1). In the same year, the king knighted the heirs of the existing baronets, and ordained that the eldest sons of baronets might in future claim knighthood on attaining majority, a provision also set forth in the earlier patents, which, after falling into disuse, was recognised in three instances, in 1824, 1827, and 1835, but disallowed in the case of the eldest son of Sir James Broun, a Nova Scotia baronet, in 1836.

An order of baronets similar to that of England was instituted in Ireland in 1619, the arms of Ulster being also allowed them, and the money going to the Irish exchequer. The first baronet of Ireland was Sir Dominick Sarsfield, then Chief-justice of the Common Pleas in Ireland, whose patent was dated October 14, 1619.

The institution of the degree of baronet in Scotland, contemplated by James I., was carried out by his successor, the avowed object being to aid Sir William Alexander's scheme for the colonisation of Nova Scotia. The number was not to exceed

150; the sum payable was £3000, and the patents at first included grants of specified lands in that colony. As the lands conveyed and described had no actual existence, the grants were illusory; and the practice of including such grants in the patents continued down to 1638, though Nova Scotia had long before that date passed into the hands of the French. Baronets of Scotland are often called baronets of Nova Scotia; but the name can hardly be given with propriety to those created after 1638. The first creation was that of Sir Robert Gordon of Gordonstone, second son of Alexander, eleventh Earl of Sutherland, whose patent bore date 26th May 1625. The later creations of Charles I. included gentlemen unconnected with Scotland, and in one instance a lady, Dame Maria Bolles, of Osberton, Notts. In almost all patents by Charles I. the limitation was

to heirs-male whomsoever; afterwards, though there was considerable variety, the most common limitation was to heirs-male of the body. It was at first provided that baronets of Scotland should charge their coat-armour with the arms, supporters, and crest of Nova Scotia on a canton or inescutcheon. In 1629 they became entitled to wear a personal decoration or badge pendent from an orange-tawny ribbon—viz. in an escutcheon argent, a saltire azure, thereon an inescutcheon of the arms of Scotland, an imperial crown above the escutcheon, and round the whole the motto, *Fax mentis honesta gloria* (fig. 2). The wearing of this badge, having fallen into disuse after the Civil War, was revived at a meeting of the baronets of Scotland in 1775. In representations of the arms of a baronet of Scotland, it is usual to place this badge below the shield, hanging from an orange-tawny ribbon surrounding it.

No baronets of Scotland have been created since 1707, and of Ireland since 1801. Later baronets are of Great Britain or of the United Kingdom.

Baronets take rank immediately after the younger sons of barons; and it is usually understood that they take precedence among themselves, after the analogy of peers, as follows: Baronets of England; of Scotland; of Great Britain; of Ireland; of the United Kingdom. The Ulster King of Arms, however, contends that in the absence of any direct legislative provision to the above effect, baronets of all classes should rank only according to the dates of their patents.

Baronets take rank immediately after the younger sons of barons; and it is usually understood that they take precedence among themselves, after the analogy of peers, as follows: Baronets of England; of Scotland; of Great Britain; of Ireland; of the United Kingdom. The Ulster King of Arms, however, contends that in the absence of any direct legislative provision to the above effect, baronets of all classes should rank only according to the dates of their patents.

Baronius, CÆSAR, a great Catholic ecclesiastical historian, born at Sora, in Naples, 30th August 1538. Coming to Rome at nineteen, he was one of the first pupils of St Philip Neri, and attached himself to his congregation of the Oratory, of which he afterwards became superior (1593). Here, by long and severe study, he laid the foundation of his fame. The immediate occasion of his great work was the necessity of replying to the Protestant historical work known as the *Magdeburg Centuries*. His object was to prove that the Church of Rome was identical in doctrine and constitution with the Christian Church of the 1st century. This he did in his *Annales Ecclesiastici a Christo nato ad annum 1198* (12 vols. 1588-93). Honours were now showered upon his head. He became confessor to the Pope, apostolical protonotary, cardinal in 1596, librarian of the Vatican Library, and would have been elected pope on the death of Clement VIII. in 1605 but



Fig. 2.

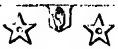


Fig.

for the opposition of the Spaniards, who were indignant at him for his treatise, *Tractatus de Monarchia Siciliæ* (in vol. xi. of his great history), in which he argued against Spain's claim to Sicily. He died June 30, 1607, and was canonised by Gregory XV. in 1622. The best edition of the *Annales* is that edited by Mansi (38 vols. Lucca, 1738-59), which contains Pagi's *Critica*. Odoricus Raynaldus wrote a continuation down to the year 1565 (9 vols. 1646-76). A new edition of the work, with the continuations of Raynaldus and others, is that of A. Theiner (37 vols., Bar le Duc, 1864-83), who himself wrote a continuation for the years 1572-85 (Rome, 3 vols. 1857). Amongst other works of Baronius, his publication of the *Martyrologium Romanum* deserves to be noticed (Rome, 1586, and often reprinted).

Baron of Beef, a large piece of beef, consisting of both sides of the back, or a double sirloin, and weighing, according to the size of the animal, from 50 to 100 lb. This monstrously large piece of beef, roasted, is served only on particular festive occasions at the English court, and at great public entertainments. When served according to ancient custom at civic feasts in Guildhall, London, the baron of beef is honoured with a distinguished place on a kind of elevated rostrum, where it is ceremoniously carved for the assembled guests. The derivation of the term is unknown.

Barons' War. See MONTFORT.

Barony is, or, it may rather be said, was a manorial and hereditary right arising out of land, known to the law both of England and Scotland. In England, manors were formerly called baronies. In the Scots law, a right of barony is a right in relation to lands which have been erected by a crown-charter making the grant *in liberam baroniam*. It involved a civil and criminal jurisdiction to which, in theory, all the inhabitants of the barony lands were amenable, but this was greatly reduced by the Heritable Jurisdictions Act passed after the Rebellion of 1745, and now exists only on the civil side for the purpose of recovering rents and duties, &c. The barons had also powers with reference to the trading privileges and municipal government of certain burghs, but trading privileges were abolished in 1847, and nearly all the older burghs have now adopted modern Police Acts (see BUTCH). Baronial jurisdiction, however, is still permitted in villages on the sea-coast for encouragement of fisheries, and the bailies thereof (see BAILIE) have the powers of justices of the peace. In England, the lord or baron of the manor may hold his Court Baron (q.v.: see also MANOR). In Ireland, the barony is the largest subdivision of the county. The Baronial Session deals with the expenditure of the barony, subject, however, to the authority of the Presentment Sessions for the whole county. The Baronial Session consists of local justices of the peace and an arbitrary number of elected cesspayers.

Baroque (Portuguese *barroco*, 'a rough, irregular pearl'), originally a mere jewellers' term, but soon extended in sense, and applied in art to ornamental designs of an extravagant or incongruous character. The style followed the Renaissance in Italy, and was much in vogue from the middle of the 16th to the end of the 18th century. Aiming at surprises and general oddness, baroque depends entirely on the fancy and caprice of the architect, and, by means of over-accentuation and distortion of all straight lines, produces an effect often bold and ingenious, and sometimes picturesque, but always opposed to the established rules of art. Like Rococo (q.v.), the term baroque is often used to indicate bad taste somewhat generally.

Barosma. See BUCKU.

Barotse, a central branch of the Bantu family, in Africa, occupying the valley of the same name, on the Upper Zambesi. The Barotse valley is subject to inundations of the Zambesi, and is fertile, but little cultivated.

Barque, or BARK, a general name frequently given to small ships, square-sterned, without head-rails; but specially applied to a three-masted vessel whose mizzen-mast is 'fore-and-aft' rigged instead of being square-rigged, like the fore and main masts. These were formerly small vessels only, but now barques of over 3000 tons are frequently built. See SHIP, SAILS.

Barquisimeto, a town of Venezuela, the capital of a province of the same name, situated on an affluent of the Tocojo River, in a fertile and healthy plain, about 1700 feet above sea-level. Founded in 1522, it became a flourishing town, but was destroyed in 1812 by a dreadful earthquake. Pop. (1881) 28,918.—Barquisimeto is also the name of one of the two sections of the great province of Lara, as divided in 1881; it has an area of 7375 sq. m., and a pop. (1881) of 176,079.

Barra, a small island of Inverness-shire, near the southern extremity of the Outer Hebrides, 42 miles W. of Ardnamurchan Point. It is 8 miles long, and 2 to 5 broad, with deep inlets of the sea; its area is 25 sq. m. A low sandy isthmus, over which the sea nearly breaks at high water, connects the two parts into which Barra is divided. The south or larger part contains a rocky mountain, 2000 feet high, and is divided into small valleys. The island is formed of gneiss. The soil is sandy, but sheep and cattle are fed on the hill and meadow pastures. Pop. (1841) 1577; (1861) 1591; (1881) 1869, Gaelic-speaking, and largely Catholic, and among the most industrious of Scottish fishermen. A lighthouse, built on Barra Head in 1833, is 680 feet above the sea, and is seen 33 miles off. Kismull Castle was the ancient seat of the McNeills, who in 1840 sold the island to Colonel Gordon of Chivy.

Barra, a pleasant suburban town about 3 miles E. of Naples, with a pop. (1881) of 8464.

Barra, a petty Mandingo kingdom of Western Africa, near the mouth of the Gaubia, with an estimated pop. of 200,000, the men being remarkable for their fine proportions. The surface, which is fertile, but rather marshy, is well cultivated. The territory about the mouth of the river belongs to the British, who have built the port of Albreda on the south bank, from which considerable trade is carried on. The chief town is Barrinding, where the so-called king resides.

Barrackpur, a native town and military cantonment, Bengal, on the E. bank of the Hooghly, and 15 miles up the stream from Calcutta. It is a favourite retreat for Europeans from Calcutta; and to the south is its park, containing the suburban residence of the Viceroy of India. Two sepoy mutinies have occurred here, the first in 1824, when a regiment of Bengal infantry refused to go for service in the Burmese war, again in the famous mutiny of 1857. Pop., with Nawabganj (1881) 17,702.

Barracks (originally derived through the Fr. *baraque*, from the Ital. *baracca*, or the Span. *barraça*) are permanent structures for the accommodation of soldiers, sailors, or police. Great opposition was made in this country to the introduction of permanent barracks during the early part of the last century, on the ground that the liberty of the subject might possibly be endangered by thus separating the soldiery so completely from the citizens, and placing them in the hands of the ruling power. On the other hand, it was contended that the older system of

billeting the soldiers on the people is vexatious and burdensome; and that the morals of towns-people and villagers are liable to be vitiated by the constant presence of soldiers. The permanent barracks were few in number down to the year 1792, when George III. obtained the consent of parliament for the construction of several new ones, and for the founding of the office of barrackmaster-general. Various changes in the arrangements were made from time to time. The expenditure for barracks, in building, rebuilding, enlarging, and repairing, between 1793 and 1804, was £4,100,000; between 1804 and 1819, £3,220,000; and between 1819 and 1859 (including Aldershot Barracks, q.v.), upwards of £7,000,000. The cost varied from £27 to £209 per soldier accommodated, according to the inclusion or exclusion of officers' quarters, &c. The barrackmaster-general was replaced at the beginning of this century by commissioners for barracks, whose functions were absorbed in 1822 by the now extinct Board of Ordnance. Barracks are now under the supervision of the Surveyor-general of the Ordnance, who provides for their construction and maintenance through the Royal Engineers; and for their victualling and daily service through the Commissariat Department, with barrack-clerks and barrack-sergeants to assist in these duties. Barrack furniture is bought by the War Office at a cost of 25s. per man, and repaired at the expense of the troops. The French have a singular plan of *hiring* such furniture at 15 francs per man per annum, which is in some respects a better arrangement. The barrack-rooms have arm and accoutrement racks, shelves, and pegs; with a regular order for depositing everything thereon. During the day, all the arms, clothing, bedding, dishes, and tins are placed in exact array, and the iron bedsteads are turned down only at night. A subaltern officer visits every room every day. One non-commissioned officer (sergeant or corporal) has control over each room, and is responsible for quiet, cleanliness, &c. Each soldier in a barrack has the use of an iron bedstead, a rug, a pailasse, a bolster, two blankets, and two sheets; his name and number are written near his bed, and his knapsack and arms placed behind its head.

Six per cent. of the men may marry, if of good character, and with the consent of their commanding officer. Their wives must be women of good character, and are accommodated, if possible, in separate rooms, known as 'Married Soldiers' Quarters.' If quarters are not provided, a married soldier may sleep out of barracks, and is then allowed an extra 2d. per day. The provision of separate rooms for married soldiers is one of the results of the committees of inquiry appointed in 1835 and 1857. It was then found that, out of 252 barracks, only 20 had separate sleeping-rooms for married soldiers; in the other 232 they shared the rooms of the single men, with mere screens round the portion allotted to them, or else slept away from barracks altogether.

Another result of the labours of the above-mentioned committees is the greatly improved hygienic condition of barracks in such matters as drainage, ventilation, means of ablution and recreation, circulation of air, &c., and, as a natural consequence, a greatly reduced rate of mortality. Army-physicians recommend 600 cubic feet of room-space per soldier; and this is provided for in all modern barracks. It has been estimated that a new barrack for 1000 footguards in London would cost £150,000, *besides land*, of which at least 20 acres would be required to provide space for drill-grounds, stores, hospital, offices, &c.

The finest existing barracks in this country are perhaps those at Aldershot (q.v.). The infantry barracks each form a spacious quadrangle, with a

court-yard in the centre, complete for a full battalion, with all the men's rooms at one end, and store-rooms, school-rooms, offices, married men's quarters, &c. on the other three sides. The officers' quarters are separate, and occupy open spaces between the barracks. The men's living and sleeping rooms, each for 24 men, are very large and airy; the washing-rooms are ample and well fitted; and the cooking-rooms will each cook for 350 men. These together form two blocks, each three stories high, connected by a glass roof, covering a drill-ground and the staircases, which communicate with broad balconies outside the rooms. The artillery and cavalry barracks resemble in their general features those for the infantry. The stables are under the men's rooms.

By the Military Forces Localisation Act of 1872, £3,500,000 was to be raised and expended in building and adapting barracks for the 70 regimental districts among which the infantry is now divided. By 1887 most of these had been completed, and are fine buildings. They are, when practicable, constructed to accommodate two battalions, one on each side of a spacious parade-ground, with all the necessary offices, and made, to a certain extent, defensible by being surrounded by a high loopholed wall.

Barrafranca, a town of Sicily, in the province of Caltanissetta, near the town of that name, with a pop. (1881) of 9052.

Barra Mansa, a town of Brazil, on the Paraíba, 70 miles NW. of the city of Rio de Janeiro. Pop. 5000.

Barranquilla, the principal port of the United States of Colombia, in the state of Bolívar, lies near the left bank of the main channel of the Magdalena, 15 miles distant from the sea. A railway runs to the coast; and recently the bar at the mouth of the river has been partially removed, so as to enable sea-going vessels to come up to Barranquilla, which possesses excellent wharfage accommodation. The inland traffic by river-steamers is important. The trade is mainly in the hands of Germans. Pop. about 20,000.

Barrantes, VICENTE, a Spanish writer, born at Badajoz, 29th March 1829. He early made a reputation by his dramatic pieces, political satires, stories, and ballads. In 1858 he entered the cortes, and in 1872 was elected to the Spanish Academy. Amongst his works are *Váje a los Infernos*, a political satire, and an historical work on the Philippine Islands.

Barras, PAUL - JEAN - FRANÇOIS - NICOLAS, COMTE DE, a prominent figure in the French Revolution, was born June 30, 1753, at Fos-Emphoux in Var, of one of its oldest noble families. In his youth he served against the English in India, but soon returning home, plunged into a life of reckless dissipation at Paris. But he soon found worthier impulses in the fever of revolution. A member of the Jacobin Club from the outset, he represented Var in the National Convention, voted for the execution of the king without delay, and had a share in the downfall of the Girondists. He conducted the siege of Toulon, and suppressed, not without great cruelty, the revolt in the south of France. Clated by Robespierre as not decided enough, he attached himself to his opponents, and played the chief part in the tyrant's downfall, being appointed by the terrified Convention virtual dictator for the time. In this capacity he crushed the intrigues of the Terrorists with decision and vigour, and his humanity saved the reaction from being more bloody than was just. On subsequent occasions he acted with decision both against the intrigues of the Royalists and the excesses of the Jacobins; and on 13th Vendémiaire (5th October)

1795, being again appointed commander-in-chief by the Convention, he called his young friend Bonaparte to his aid, who crushed the insurgent sections, and assured his own future with the historical 'whiff of grape-shot.' The Directory being appointed in November 1795, Barras was nominated one of the five members. On 18th Fructidor (4th September) 1797, he was again made dictator, whereupon he removed his opponents, whom he accused of royalism, from both councils. From this time he guided the state almost alone, until his covetousness and love of pleasure had rendered him so unpopular that Bonaparte, with the help of Siéyes, was able to overthrow him easily on the 18th Brumaire (November 9) 1799. Compelled to remove from the neighbourhood of Paris, he resided in Brussels, then in Marseilles, but was banished to Rome, and thence sent to Montpellier, being kept under constant surveillance of the police, who actually found him to have been engaged in conspiracies for the bringing back of the Bourbons. After the Restoration he returned to Paris, and purchased an estate near the city with part of the great fortune he had acquired in the Revolution. He died 29th January 1829.

Barratry, COMMON, or *Barrettry*, is the offence of inciting and stirring up suits and quarrels among the queen's subjects. It must be shown that the party accused *frequently*, or at least on more than one occasion, conducted himself in the way imputed. The term is probably the same as the French *baraterie*, which Littré derives from a root *barat* meaning 'fraud.' The punishment for this offence is fine and imprisonment; but if the offender belongs to the profession of the law, he may besides be disabled from practising his profession for the future. And, indeed, it is the existing statute law of England, that if any one who has been convicted of barratry shall practise as an attorney, solicitor, or agent in any suit, he may be kept in penal servitude for not more than seven or less than three years.

Akin to this offence is that of suing another in the name of a fictitious plaintiff. If committed in any of the superior courts, this offence is treated as a high contempt, punishable at discretion, and in inferior courts, by six months' imprisonment, and treble damages to the party injured.

Barratry, in the sense above explained, is not a technical term in the law of Scotland. But in that system there is a word *Baratry*, which is defined as the crime committed by a judge who is induced by a bribe to pronounce a judgment, or who barter justice for money.

There is also *Baratry of Mariners*, which signifies—in the law not only of England and Scotland, but also of France and other European states—the fraud or wrongful act of the master or mariners of a ship tending to the prejudice of the owners of the ship or cargo. Such conduct is one of those risks which are usually insured against in marine policies of insurance. See **INSURANCE**.

Barré, ISAAC, British soldier and politician, was born at Dublin in 1726. Gazetted as an ensign in 1746, he became friendly with General Wolfe, under whom he rose to the rank of lieutenant-colonel. He was wounded in the cheek at Quebec, was beside Wolfe when he fell, and figures in West's picture of 'The Death of Wolfe.' He entered parliament in 1761, and held office successively under Lord Bute, Pitt, Rockingham, and Lord Shelburne. In Pitt's second administration he exposed the corruptions of the ministry, was a strong opponent of Lord North's ministry, and opposed the taxation of America. He died in London, 20th July 1802.

Barrel, primarily a large vessel for holding liquids, next a *measure* for various wares and quantities. The barrel of ale and beer contains 36 imperial gallons. The barrel of herring contains about 800 herrings. *Barrel* also signifies a certain weight or other quantity of goods usually sold in casks called barrels; of salt meat, 200 lb.; butter (4 firkins), 224 lb.; soap, 256 lb.; gunpowder, 100 lb.; flour, 196 lb.; and raisins, 112 lb. In America, flour and beef are sold on the large scale in barrels; a barrel of flour must contain 196 lb.; of beef, 200 lb. A barrel of rice contains 600 lb.; of gunpowder, 25 lb.; of fish, salt meat, or bacon, 200 lb.

Barrel-organ, a mechanical organ whose music is produced by a barrel or cylinder, set with pins and staples, which, when driven round by the hand, opens the valves for admitting the wind to the pipes according to the notes of the music. The number of tunes that any one instrument can play is, of course, very limited. Barrel-organs are generally portable, and mostly used by street-musicians; though they were not unknown in English country churches in the latter half of the 19th century. The most perfect barrel-organs are those which are driven by a motive-power, of which the best are made in Vienna. A successor of the hurdy-gurdy, the barrel-organ itself has been largely superseded by the barrel-piano.

Barren Island, a small volcanic mass in the Bay of Bengal, lying east of the Andamans, about 94° E. long. It is conical in shape, about 8500 yards in diameter, and the volcano is active.

Barrenness. See **STERILITY**.

Barrenhead, a town of Renfrewshire, 8½ miles SW. of Glasgow by rail. Founded about 1773, it has cotton-mills, and bleaching, dyeing, and print works. Pop. (1841) 3492; (1881) 7495.

Barricades, defence works formed in streets and roads of beams, chains, *chevaux-de-frise*, and other obstacles, either to defend a town against besiegers, or to shelter insurgents. They have been used in street-fights since the middle ages, but are best known in connection with insurrections in the city of Paris. As early as 1358 its streets were barricaded against the Dauphin, afterwards Charles V. A more noteworthy barricade-fight was that in 1588, when 4000 Swiss soldiers, marched into Paris by Henry III. to overawe the Council of Sixteen, would have been utterly destroyed by the populace, firing from behind barricades, had the court not consented to negotiation. The next barricade-fight of importance in Paris was that of 1830. During the three days which this revolution lasted, the number of barricades erected across the streets amounted to several thousands. They were formed of the most heterogeneous materials—overturned vehicles, trees, scaffolding-poles, planks, building-materials, and street paving-stones—men, women, and children taking part in their erection. In February 1848, the insurrection against Louis-Philippe commenced with the erection of barricades; but the most celebrated and bloody barricade-fight was that between the populace and the Provisional Government, 23d–26th June 1848, which ended in the defeat of the people. The national losses by this fight were estimated at 30,000,000 francs; 16,000 persons were killed and wounded, and 8000 taken prisoners. Napoleon III. widened and macadamised many of the principal streets of Paris, partly with the express purpose of rendering the successful erection of barricades next to impossible; but in the second siege of Paris (1871), the Communists threw up numbers of strong barricades. There was a remarkable barricade-erection in London in 1821. The ministry desired that the body of Queen Caroline should be conveyed out of

the country to Germany, for interment, without the populace having the opportunity of making any demonstration. On the matter becoming known, a vast barricade was erected at the point where the Hampstead Road joins the New Road; and as nothing but the use of artillery could have forced the way, the officer in charge of the funeral cortege deemed it prudent to change his course, and pass through a more central part of the metropolis. During the revolutions of 1848 and 1849, barricades were successfully carried in Paris, Berlin, Vienna, and Dresden, by abandoning the attack in front, and breaking through the houses of contiguous streets, so as to take their defenders in the rear.

Barrier Act, the name commonly given to an act of the General Assembly of the Church of Scotland, 8th January 1697, intended as a barrier against innovations, and a security that changes in doctrine, worship, discipline, and government shall be deliberate and in accordance with the general mind of the church. It provides that no change can be made in the laws of the church without being submitted in the form of an overture by that General Assembly which first approves it, to the consideration of all the presbyteries, and approved by a majority of them; after which it still remains to be considered by the next General Assembly, which then may or may not pass it into a law. It does not apply to declaratory acts or to acts of administration. Analogous regulations have been adopted by other Presbyterian churches.

Barrière, JEAN FRANÇOIS, a French writer, born in 1786 and died in 1868. He edited, with Berville, the great storehouse of materials for history, the *Mémoires relatifs à la Révolution Française* (47 vols. 1822, *et seq.*); and alone, *Mémoires relatifs au XVIII^{ème} Siècle* (29 vols. 1846-64).—THEODORE BARRIERE, an active French dramatist, born in 1823 at Paris, produced a long series of dramas, including *Filles de Marbre* (1851), *Les faux Bonhommes*, his masterpiece (1856), *Cendrillon*, and *Le Démon de Jeu* (1863). He died 16th October 1877.

Barrier Reef, an immense coral-reef extending along the NE. coast of Australia for over 1000 miles, at a distance from the shore of from 10 to upwards of 100 miles. The reef is, in general, precipitous, and in many places rises out of great depths, lines of 280 fathoms having failed to reach the bottom on the outer side. Ignorance of its extent led to many shipwrecks; but it has now been surveyed and laid down on charts. In the course of its length there are several breaks or passages in it, only one, however, being safe for ships. It is marked by a lighthouse, and is called Raines Inlet. The reefs called *barrier reefs* are one of the three characteristic kinds of coral formations, being distinguished both from *fringing reefs* and from *atolls*. See CORAL ISLANDS; also POLYNESIA.

Barring Out, a practice once common in schools, which consisted in the scholars fastening the doors against the master. The usual time for it was immediately prior to the vacations; and it seems to have been an understood rule that if the scholars could sustain a three days' siege, they were entitled to dictate terms regarding the number of holidays, hours of recreation, &c. for the ensuing year. If, on the other hand, the master succeeded in forcing an entry, the insurgents were entirely at his mercy. The masters, in most cases, appear to have acquiesced good-humouredly in the custom; but some chafed at it, and exerted their strength and ingenuity to storm or surprise the garrison. Addison, according to Johnson, was the leader of a barring out at Lichfield about the year 1686. One

remarkable and fatal case of barring out occurred at the High School, Edinburgh, in 1595. The town council refused to grant more than three of the eight holidays which the boys demanded as their privilege. They accordingly took advantage of the master's temporary absence to lay in a store of provisions, and having done so, barricaded the doors. The magistrates, the patrons of the school, in vain sought admission, the boys saying they would treat with their master only; and after a day and night had passed, it was resolved to force an entrance. The result was that one of them, Bailie Macmoran, was shot dead on the spot by a scholar named Sinclair. The statutes of Witton School, Cheshire, founded by Sir John Deane in 1558, ordained that 'a week before Christmas and Easter, according to the old custom, the scholars bar and keep forth the school the schoolmaster, in such sort as other scholars do in great schools.' A barring out forms the theme of one of Miss Edgeworth's stories.

Barrington, GEORGE, pickpocket and author, was born in 1755 at Maynooth, Ireland, the son of a silversmith named Henry Waldron. In 1771 he ran away from school, and coming to London, turned pickpocket, on one occasion robbing Prince Orloff of a snuff-box, set with brilliants, valued at £30,000. Twice previously convicted, he was finally sentenced in 1790 to transportation to Botany Bay, but having on the voyage out frustrated a conspiracy amongst the convicts, he was emancipated in 1792. He became superintendent of the convicts, and high constable of Paramatta, New South Wales, where he died at a great age. His prologue, written for Young's tragedy, *The Rencue*, at its representation by convicts at the opening of a theatre at Sydney, January 16, 1796, is too witty to be forgotten:

From distant climes, o'er widespread seas, we
Though not with much *clat* or heat of drum;
True patriots we, for be it understood,
We left our country for our country's good.
No private views disengaged our generous zeal,
What urged our travels was our country's weal
And none will doubt, but that our emigration
Has proved most useful to the British nation.

He was author of *A Voyage to Botany Bay* (1801), *The History of New South Wales* (1802), and *The History of New Holland* (1808).

Barrington, (1) JOHN SHUTE, 1st Viscount BARRINGTON, the son of a London merchant, was born in 1678, and called to the bar in 1699. In 1704 he published his *Rights of Protestant Dissenters*, which gained him the confidence of the Presbyterians. His *Dissertation from Jacobitism* (1713) recommended him to George I., and he was raised to the Irish peerage as baron and viscount in 1720. He was returned for Berwick in 1715, and again in 1722, but was expelled from the House of Commons in 1723 on account of his connection with a bubble speculation of the time. This excessive punishment was generally ascribed to the malice of Walpole. He died in 1734. His works, mostly theological, were published in 3 vols. in 1828. Of his six sons, the following deserve notice.—(2) WILLIAM WILDMAN, 2d Viscount, his eldest son, born in 1717, sat for Berwick-upon-Tweed in 1740, and until 1778 constantly held office, either in the Admiralty, the War Office, the Exchequer, or the Post-office. He died in 1793.—(3) DAINES, the fourth son, born in 1727, was called to the bar, where he attained a considerable position. His numerous writings embrace law, antiquities, and natural history, but his only important work is his *Observations on the Statutes* (1766). He died in 1800.—(4) SAMUEL, a distinguished naval officer, was the fifth son. In 1787 he was made admiral, and he died in 1800.—(5) SHUTE,

the youngest son, was born in 1734, ordained in 1756, and became successively Bishop of Llandaff, of Salisbury, and (1791) of Durham. He died in London in 1826.

Barringtoniaceæ. See MYRTACEÆ.

Barrique, an old French wine-measure. The barrique of Bordeaux was equal to 228 litres.

Barrister is the distinctive name by which the advocates or pleaders at the English and Irish bars are known; and thus its derivation is perhaps sufficiently accounted for. They are admitted to their office, under the rules and regulations of the Inns of Court (q.v.), and they are entitled to exclusive audience in all the superior courts of law and equity, and generally in all courts, civil and criminal, presided over by a superior judge. In the whole of the county courts solicitors are allowed to practise without the assistance of counsel; also at petty sessions, though at the quarter sessions where four counsel attend, the justices always give them exclusive audience (see SOLICITORS).

Barristers were first styled *Apprentices*, who answered to the bachelors of the universities, as the state and degree of a serjeant did to that of a doctor. These apprentices or barristers seem to have been first appointed by an ordinance of King Edward I. in parliament, in the twentieth year of his reign (Stephen's *Commentaries*, and authorities there referred to). Of barristers, there are various ranks and degrees, and among each other they take precedence accordingly; the general name, 'counsel,' being, in the practice of the court, common to them all. But they may be divided into two groups—barristers and Queen's Counsel. (The ancient order of *serjeants-at-law*, formerly a well-marked third group, was distinguished by the *coif* and other peculiarities, but has now ceased to exist. See SERJEANT-AT-LAW). *Barristers* simply, or utter barristers, occupy the position of junior counsel, wearing a plain stuff-gown and a short wig; *King's or Queen's Counsel*, or His (or Her) Majesty's Counsel learned in the law, as they are more formally called, are selected from the outer or junior bar. They are the leaders of the bar, and are distinguished by a silk gown; on state occasions, and always in the House of Lords, they wear a full-bottomed wig. For further details, see KING'S COUNSEL. Besides these three orders, the crown sometimes grants letters-patent of precedence, whereby the grantee is entitled to such precedence as may be assigned to him (see PRECEDENCE).

Barristers have exclusive audience in all the superior courts, where upon terms and conditions, and according to an etiquette, which are all well understood, they take upon themselves the protection and defence of any snitor, whether plaintiff or defendant. With the *Brief* (q.v.), or other instructions, barristers receive a *fee*, or such fee is indorsed on the brief or instructions, and afterwards paid. Such, generally, is the existing practice at the English bar, differing in this respect from the practice of the bar in Scotland—and, we believe, to a great extent in Ireland also—where prepayment of the fee is the rigid etiquette. The barrister's fee is not a matter of express contract or stipulation, recoverable at law like a solicitor's bill of costs, but is regarded as a mere honorary reward—*quiddam honorarium*, as it is called in law-books. There is therefore no means of enforcing its payment; but where it can be proved that the client or party gave money to the solicitor with which to fee the counsel, the latter may maintain an action against the former for the amount in some special cases.

In order to encourage due freedom of speech in

the lawful defence of their clients, and at the same time to give a check to unseemly licentiousness, it has been held that a counsel is not answerable for any matter by him spoken, relative to the cause in hand, and suggested in his client's instructions, although it should reflect upon the reputation of another, and even prove absolutely groundless (though the publication of the counsel's statement by a *third party* may expose such third party to an action); but if he mentions an untruth of his own invention, or even upon instructions, if it be impertinent to the cause in hand, he is then liable to an action from the party injured; and counsel guilty of deceit or collusion are punishable by the statute Westm. I. (3 Edw. I. chap. 29) with imprisonment for a year and a day, and perpetual silence in the courts—a punishment which may be inflicted for gross misdemeanours in practice, although the course usually resorted to is for the Benchers of the Inn of Court to which the person so offending belongs, to *disbar* him (see INNS OF COURT, DISBAR).

Besides advocacy and forensic disputation, barristers in England advise on the law by giving an opinion on a case stated—'opinion of counsel'; they also draw or prepare the pleadings or statements of fact on which an action is founded; and they prepare or revise the drafts of deeds and other instruments and of private bills (see the article CONVEYANCING). As a correlative privilege of the position in which they stand in respect of their fees, barristers are not personally liable for the injurious consequences of any erroneous advice they may give; and they claim absolute control over the conduct of all litigation in which they may be engaged, even to withdrawing it from court, unless the client expressly dissent; and until lately, it was the opinion of the profession that counsel might at any time, during the progress of a cause, compromise the matter in dispute; but the exercise of such discretion has been successfully opposed, and it is now admitted that barristers have no *ex officio* privilege beyond the guidance and conduct of actual litigation in court.

It is from the body of barristers that all the judges in England, superior and inferior, are appointed; and barristers are also always chosen for the office of paid magistrate. The only exception to the exclusive appointment of barristers to judicial offices is the case of justices of the peace (see QUARTER SESSIONS).

The bar in Ireland stands on the same footing, and has the same ranks and degrees, and is subject very much to the same rules and regulations, as the English bar; and in that country, barrister also is the name by which the profession of an advocate is distinguished. In Scotland, the same office is simply called by its own name of *Advocate* (see ADVOCATES, FACULTY OF).

At the bar of the House of Lords, and before parliament generally, before the privy-council, and also, it is believed, in all trials for high treason, whether in England, Ireland, or Scotland, the three bars rank on a footing of equality, taking precedence according to the date of their call and admission to their own respective bars, with the exception of King's Counsel. In Scotland, the latter are next in precedence to the Lord Advocate (see ADVOCATE, LORD), the Solicitor-general of Scotland (q.v.), and the Dean of the Faculty of Advocates. It was at one time disputed between the Lord Advocate of Scotland and the Attorney-general of England, which of them should lead the other at the bar of the House of Lords; and a struggle for precedence occurred in 1834 in the House of Lords, before Lord Chancellor Brougham, between Lord Chancellor Campbell as Attorney-general, and Lord Jeffrey as Lord Advocate. The

latter contended that as he was not only the first law-officer of the crown in Scotland, but also a high political officer, he was entitled to lead the former. But the House decided that the Attorney-general of England has precedence over the Lord Advocate of Scotland, in all matters in which they may appear as counsel at their lordships' bar. The relative rank of the *Irish* law-officers to English is the same. It only remains to add, that as the three bars are on a footing of equality in the House of Lords, and before the other imperial tribunals above mentioned, the English bar have no exclusive audience in these, even in English cases.

Revising Barrister is a barrister appointed annually by the English judges to revise the lists and settle who are the persons entitled to vote for members of parliament. For this purpose, all England is subdivided into districts, and a barrister is appointed for each district by the judges of assize. Though the appointment is only for one year, the same person is usually reappointed for a series of years. The barrister must be of seven years' standing at least. The revision of the lists takes place generally between August and October of each year. The powers and duties of the revising barrister are defined by the Registration Act of 1878. There is an appeal from his decision to the Queen's Bench Division of the High Court of Justice.—Similar duties are performed in Scotland by the sheriff-substitute.

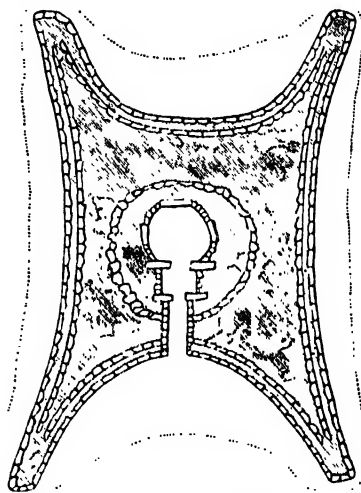
Barros, João de, the most distinguished of Portuguese historians, was born at Vizeu in 1496, and died in 1570. He wrote an historical romance which attracted much admiration, and in 1522 he was appointed governor of the Portuguese settlements in Guinea, in 1532 treasurer of the Indies. Hereupon the king assigned him the task of writing the history of the Portuguese in India, which he undertook. But only the first four decades, down to 1526, proceeded from his pen, under the title of *Asia Portuguesa*; the continuation was the work of Diego de Couto.

Barro'sa, a village of Spain, 16 miles SSE. of Cadiz, celebrated in history as the place where General Graham (afterwards Lord Lynedoch), March 5, 1811, with a handful of English troops, succeeded in gaining a glorious victory over the French.

Barrot, Camille Hyacinthe Odilon, a prominent French statesman, born at Villefort, Lozère, 19th July 1791. At nineteen he pleaded before the ordinary tribunals, and at twenty-three, by a special dispensation, before the Court of Cassation, Paris, and early acquired a high reputation for eloquence. In the political arena also, his oratory soon made him one of the most influential leaders of the liberal opposition. He became president of the 'Aide-toi' Society in 1830, and at the July revolution in that year, was one of the three commissioners appointed to conduct the dethroned Charles X. to Cherbourg, on his way to England. On his return he was appointed prefect of the department of the Seine, and member of the Council of State, but in a few months resigned his offices to lead the opposition to Casimir Prier and the reactionary ministers who followed him. He supported Thiers from his accession to office in March 1840, to his fall in October, when he resumed his opposition to the ministry of Guizot. He took a conspicuous part in the reform movement of 1847, and spoke eloquently at several of the provincial reform banquets which led to the revolution of February 1848. Made president by Thiers in his short-lived ministry he advised the king to withdraw his troops and thus remove the last obstacle to the downfall of his throne. In the last sitting of the

Chamber of Deputies, he supported the claim of the Count de Paris to the throne, and the regency of the Duchess of Orleans. The February revolution considerably abated his ardour for public liberty. He held office for some time under the presidency of Louis Napoleon, but retired from active political life after the *coup d'état*, 2d December 1851. In July 1872 he was made a councillor of state and vice-president of the council; but he died at Bougival, near Paris, 6th August 1873. His *Mémoires Posthumes* appeared at Paris (4 vols. 1875-76).

Barrow, a sepulchral mound of earth or stones raised over the site of a burial as a mark of honour to the dead. The barrows of the Stone Age in Europe are mostly constructions of stones, oblong, oval, or circular on the ground-plan, and containing chambers for the reception of the burials. A passage opening from the exterior gives access to the chamber, which is usually situated at or near the centre of the barrow. The chambered barrows, which are peculiar to the Stone Age of Britain, are



Plan of Chambered Barrow or Cairn, at Garrywhin, Caithness.

now structureless heaps in external appearance, but were originally faced with dry-walling on the external outline of the ground-plan. The oblong variety is occasionally from 200 to 300 feet in length, and sometimes contains several chambers. Commonly, however, the chamber is situated at one end of the barrow, which in many cases faces the east, and is usually higher than the other end. The passage leading into the chamber starts from between two concave or convex projections of the end of the barrow. It is commonly low and narrow towards the exterior, increasing in height and width as it approaches the chamber. The framework, so to speak, of the chamber and passage is commonly constructed of very large stones, and hence these chambers are often referred to as *megalithic*, and the framework of such a chamber, whether covered with a mass of smaller stones and earth, or uncovered, is called a *dolmen*, and often, erroneously, a *cromlech*. The passages are usually lintelled over with great flat stones, but the roof of the chamber is constructed of beehive vaulting (see *BEEHIVE HOUSES*). The chamber is often divided into compartments by partitions of slabs, or has smaller chambers opening from its sides. The burials in the chambered barrows are mostly after cremation, accompanied by urns of dark-coloured, hard-baked paste, with rounded or hemispherical bottoms.

The oval and circular barrows with internal chambers are smaller, and probably later than the long barrows. They also have their external outline defined by dry-walling, and are sometimes surrounded by a trench, or by a ring-fence of standing stones. The mode of burial is the same as in the long barrows, chiefly after cremation, accompanied by urns of the same character, and by implements, weapons, and ornaments of stone and bone. Indications of funeral feasts occur in all the chambered barrows, the deposits being intermixed with bones of the domestic animals—the horse, ox, dog, sheep, swine, and occasionally the red-deer, and various species of fish and fowl. The chambered barrows of Brittany and Denmark differ from those of Britain in having their chambers flat-roofed, often with a single stone of enormous size.

The barrows of the Bronze Age in Europe are circular in form and unchambered. They are characterised by single burials, placed in cists, or simple inclosures of flat stones, like chests, the sides, ends, and cover each formed of a single slab. A barrow may contain one or many cists, but the principal burial is usually near the centre. The cists may be placed on the original surface, or at some depth beneath it. The burials in them are commonly burnt, but often unburnt, this varying with the locality. Both burnt and unburnt interments may be accompanied by urns, but occasionally no urn is present. Sometimes a barrow may contain no cists, but simply deposits of burnt bones inclosed in large cinerary urns set in the soil, or with the urns inverted over them. The urns associated with burnt burial differ in form and purpose from those usually found with unburnt burial. The cinerary urn in Britain is large and wide-mouthed, and ornamented only on the upper part. The urns set in the cists with unburnt bodies are of two varieties—one somewhat bowl-shaped, tapering to a narrow base, nearly as wide as it is high; and the other tall, thin-lipped, and bulging below. Both varieties are usually ornamented over the whole surface.

The barrows of the Iron Age in Europe are mostly earthen mounds. In Britain they are few in number. The Anglo-Saxon burial-places of the heathen time are often cemeteries of graves undistinguished by barrows or mounds upon the surface. In Scandinavia, some of the larger barrows have chambers constructed of timber, but without passages. Such was the barrow of Queen Thyia at Jellinge, in Jutland, erected in the 10th century. The three great mounds or barrows at Upsala, in Sweden, contained burnt burials of the early Iron Age. In the later 'Viking time,' unburnt burial was the common practice. Some of the larger Viking barrows contained the ship, fully equipped as she rode the sea, and the owner laid in state in a house constructed on the deck, as in the case of the Viking ship discovered in 1880 at Gokstad Sandefjord, and now in the museum at Christiania.

The erection of barrows as marks of distinction in burial appears to have been a common custom among the early races, whether of high or of low culture and civilisation. It is repeatedly referred to in the Homeric poems. The barrows raised over the burnt bones of Hector and of Achilles and Patroclus are described as constructed of stones and earth, like those of prehistoric times, but unchambered. Herodotus describes the Scythian custom of barrow-burial as existing in his time; and in the case of the barrow raised over Hephaestion, the friend of Alexander the Great, we have the cost of its construction stated at 1200 talents, which has been computed as equivalent to something like £232,500 sterling. See Canon Greenwell's *British Barrows* (Oxford, Clarendon Press, 1877), and other works cited at **ARCHÆOLOGY**; also **BURIAL**.

Barrow, a term applied to three prominent localities of the Arctic Ocean, in honour of Sir John Barrow.—(1) *Point Barrow*, on the northern coast of Alaska, in 71° 23' N. lat. and 156° 31' W. long., long received as the most northerly spot on the American mainland (but see **BELLOTT STRAIT**, **BOOTHIA**).—(2) *Cape Barrow*, on the northern coast of Canada, or Coronation Gulf, 68° N. lat., 111° W. long.—(3) *Barrow Strait*, the earliest of Parry's discoveries, leading to the west out of Lancaster Sound, which Parry's immediate predecessor, Captain, afterwards Sir John Ross, had pronounced to be landlocked in that direction. Besides its main course to Melville Sound, Barrow Strait throws off Prince Regent's Inlet to the south, and Wellington Channel to the north. The passage averages about 50 miles in breadth, extending pretty nearly along the parallel of 74° N., from 85° to 100° W.

Barrow, a river in the south-east of Ireland. Of the Irish rivers, it is in importance next to the Shannon. It rises in the north of Queen's County, on the north-east slope of the Slieve Bloom ridge of mountains. It flows first east past Portarlington to the border of County Kildare, and then southward, passing the towns of Athly, Carlow, and New Ross. It has a course of 100 miles through a carboniferous, granitic, and silurian basin. Two miles above New Ross it receives the Nore, and 8 miles east of Waterford, it is joined by the Suir (q.v.). These three rivers (called the Three Sisters) form, near the sea, the large and secure estuary of Waterford harbour, 9 miles long. The Barrow is navigable for ships of 300 tons to New Ross, 25 miles up, and for barges to Athly, 65 miles up, whence the Grand Canal communicates with Dublin.

Barrow, ISAAC, a mathematician and divine, was born in 1630 in London, where his father was linen-draper to Charles I. At the Charterhouse he was chiefly distinguished for pugnacity; but at Felstead, in Essex, his next school, he greatly improved; and in 1643 he was entered at Peterhouse, Cambridge, under his uncle, Isaac Barrow, then a fellow of that college, and finally Bishop of St Asaph. In 1645, before he had come into residence, his uncle was ejected; so he went instead to Trinity College, where he became B.A. in 1648, fellow in 1649, and M.A. in 1652. Finding that to be a good theologian he must know chronology, that chronology implies astronomy, and astronomy mathematics, he applied himself to the latter science with distinguished success. To the classics he had already devoted much study, and on the vacancy of the Greek chair (1654), he was recommended for the office; but a suspicion of Arminianism is said to have interfered with his success. After this disappointment he went abroad (1655), and travelled four years through France and Italy, to Smyrna and Constantinople, back to Venice, and home through Germany and Holland. On the voyage from Leghorn to Smyrna, his determined personal courage seems to have been instrumental in scaring away an Algerine pirate, after a brisk exchange of shots. Soon after his return he took orders (1659), and in the following year was appointed professor of Greek. In 1662 he received the chair of Geometry at Gresham College, London, which, on his appointment to the Lucasian professorship of Mathematics at Cambridge (1663), he thought it his duty to resign. The latter also he resigned in 1669, in favour of his pupil Isaac Newton. On quitting his professorship, he obtained from his uncle a small sinecure in Wales, and from Dr Seth Ward, Bishop of Salisbury, a prebend in that cathedral. He devoted the revenues of both to charitable purposes, and resigned them in 1672, on being appointed by the king Master of Trinity College. To him, while in this office, is

due the foundation of the Trinity library, which is one of the chief ornaments of Cambridge. In 1675 he was nominated vice-chancellor of the university; in 1677 he died on a visit to London, and was buried in Westminster Abbey. He was only 47, but by his writings and the force of his personal character, he had achieved a reputation which time has left unimpaired. Of his mathematical works, the principal are his *Lectures Geometricæ* and *Lectures Opticæ*, on which his contemporary fame was chiefly based, and which show him as an immediate precursor of Newton and Leibnitz. As a theologian, his fame rests mainly on his posthumous *Treatise on the Pope's Supremacy*, and on his eloquent sermons, unmatched as specimens of clear, exhaustive, vigorous discussion. Their length, we may add, was excessive. One, on charity, lasted three hours and a half; and at Westminster Abbey, he once detained the audience so long that they got the organ to play 'till they had blowed him down.' Far the best edition of Barrow's English theological works is that by the Rev. A. Napier (9 vols. Camb. 1859), with a memoir by Dr Whewell, who in 1860 also edited his Latin mathematical works, some of which have been translated.

Barrow. SIR JOHN, was born of humble parentage at Dringley Beck, Lancashire, in 1764, and educated at Ulverston. Having for three years been timekeeper in a Liverpool iron-foundry, he made a voyage (1781) on a Greenland whaler, and after his return taught mathematics in a school at Greenwich. In 1792 he received the post of private secretary to Lord Macartney, ambassador to China; and he availed himself of his residence in China to learn the Chinese language, and to collect valuable materials, which he afterwards gave to the world, partly in articles in the *Quarterly Review*, and partly in his *Travels in China* (1804). When in 1797 Lord Macartney became governor of Cape Colony, Barrow made extensive excursions in the interior, which he described in his still valuable *Travels in Southern Africa* (1803). In 1804 he was appointed by Lord Melville secretary to the Admiralty, which situation he retained till 1845, except for a short time in 1806. Barrow also published *A Voyage to Cochín-China* (1806), *The Life of Macartney* (1807), *A Chronological History of Voyages into the Arctic Regions* (1818), *Voyages of Arctic Discovery* (1846), besides a series of lives of naval worthies. Under Peel's ministry, in 1835, he received a baronetcy. In 1845 he retired from public service, and he died in London, 23d November 1848. He rendered signal service to geographical science by suggesting and promoting Arctic expeditions; and Barrow Strait, Cape Barrow, and Point Barrow preserve his memory. He may also be claimed as the founder of the Geographical Society (1830), of which he was vice-president till his death. See his Autobiography (1847), and the Memoir by Staunton (1852).

Barrow-in-Furness. a seaport and manufacturing town of North Lancashire, situated on the south-western coast of the peninsula of Furness, opposite a small island called Barrow Island, which is traditionally reported to have been in former times a burial-place of Norse rovers. By rail it is 36 miles W.N.W. of Lancaster, and 268 N.W. of London. In 1847 it was a fishing-village of 325 inhabitants; in 1864 the population had risen to 10,608, in 1871 to 18,245, in 1881 to 47,111, and in 1891 to 51,712. This rapid increase, matched in Great Britain by only Birkenhead and Middlesbrough, is owing to Mr H. W. Schneider's discovery in 1840 of extensive deposits of rich hematite ore at Park, near Barrow; to the establishment both of mines and smelting-works; and to the opening of railway communication through-

out the district, the Furness Railway Company having constructed 108 miles of line during 1846-47. In 1859 smelting-works were established which soon gave employment to a great number of men, and converted the old fishing-village into a prosperous town. In 1866 these iron-works were amalgamated with the Bessemer Steel Company, founded three years before, as the Barrow Hematite Iron and Steel Company, which, in 1887, had 14 blast-furnaces in operation, and turning out a yearly output of 360,000 tons of pig-iron and 220,000 tons of Bessemer steel. Copper also is obtained in considerable quantity in the neighbourhood; whilst some 20,000 tons of slate are annually quarried and sent by coasters or by rail to other parts of Great Britain.

The town is built on a regular plan, mostly in rectangles, with broad, regular streets, which are traversed by steam tram-cars. It is, of course, wholly modern; and to give some idea of its rapid extension, we may mention that eight new board schools, with accommodation for 3822 children, were opened during 1875-77; and that in 1878 four new Anglican churches were consecrated on the same day, besides three built between 1865 and 1871. In 1872 a statue was unveiled of the first mayor, Sir James Ramsden, and in 1885 one of Lord Frederick Cavendish. The great ornament of the place is the town-hall, built in 1887 at a cost of £80,000.

The Dukes of Devonshire and Bredclench are the principal landowners of the town and neighbourhood. They have given name to the first two docks, which, together covering 66 acres, were opened by Mr Gladstone in 1867. The Ramsden and the Cavendish Dock (1877) cover a respective area of 78 and 200 acres, and, like their predecessors, are 24 feet deep. Barrow Island has since 1871 become the seat of great iron shipbuilding yards, which turn out vessels of from 20 to 8300 tons, and which, in full work, employ 5000 hands. Huge flax and jute-works were erected in 1872 by the great capitalists of Barrow to provide employment for women and girls, 1800 of whom find constant work. There are besides engineering works (1866), a great steam-mill (1871), furnace-building works, and iron-founding, brewing, boiler-making, &c. Its foreign trade is increasing; the imports including timber (since 1868) from Sweden and Canada, coal from Wales, and preserved provisions from New York. The chief exports are ore, steel rails, and pig-iron. Steamers ply regularly between Belfast, Glasgow, and Douglas, Isle of Man. The interesting ruins of Furness Abbey lie within 2 miles of the town; while on Piel Island there are the ruins of a castle built by the Abbot of Furness. From the excellence of the harbour, the abundant facilities of railway conveyance, and the mineral wealth of the district, it may confidently be expected that Barrow-in-Furness will still rapidly increase in importance. It was made a municipal borough in 1867; and since the Distribution of Seats Act (1885), it has returned one member to parliament. See J. Richardson's *Furness Past and Present* (Barrow, 1880).

Barry, a small island in the Bristol Channel, off the south coast of Glamorganshire, 12 miles S.W. of Cardiff. It has the ruins of an ancient castle and of two chapels.

Barry, COMTESSE DU. See DU BARRY.

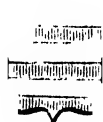
Barry, SIR CHARLES, R.A., architect, was born at Westminster in 1795, and educated at private schools in Leicestershire and Bedfordshire. In 1810 he was indentured to a firm of Lambeth surveyors; in 1817 he went to Italy. A wealthy countryman of his own, attracted by the beauty of his drawings, took him with him to the East as his companion, defraying his expenses. Returning to England in

1820, he three years later became the successful competitor for the design of a church at Brighton. He was also the architect of the Manchester Athenæum, a building in the Grecian style; and of the Grammar-school of King Edward VI. at Birmingham; the latter esteemed the most beautiful of his works. In London, he designed the Travellers' Club and the Reform Club, both in Pall Mall, and the College of Surgeons, Lincoln's Inn Fields. After the burning of the old Houses of Parliament in 1834, on a public competition Barry's design for the new building was adjudged the best. The work was commenced in 1840; and on 3d February 1852, Her Majesty opened the Victoria Tower and Royal Gallery in state, and on the occasion knighted the architect. Chosen a Royal Academician in 1841, Sir Charles was also a Fellow of the Royal Society, of the Society of Arts, &c. He died at Clapham, May 12, 1860, and was buried in Westminster Abbey. See WESTMINSTER, and the Life by his son, Bis op Barry (1867).

Barry, JAMES, an historical painter, born at Cork, October 11, 1741. He was a protégé of Edmund Burke, through whose liberality he studied for about four years in Italy (1766-70). On his return he was chosen a member of the Royal Academy, and in 1782 professor of Painting. He was of irritable temper, quarrelled with the Royal Academy, and was expelled. He died in poverty on 22d February 1806. His *chef-d'œuvre* is the 'Victors at Olympia,' one of six paintings to ornament the room of the Society of Arts. See J. Comyns Carr's *Papers on Art* (1885).

Barry, MARTIN, a physiologist of eminence, was born at Fratton, Hampshire, in 1802. He studied at the medical schools of London, and at several on the Continent, and took his degree of M.D. in Edinburgh in 1833. He wrote much on physiological subjects, and especially on animal development and embryology. He was elected a member of the Royal Society in 1840. In 1844 he was appointed house-surgeon to the Royal Maternity Hospital, Edinburgh. His means being ample, he gave his professional services largely to the poor. In 1853 he settled at Beccles, in Suffolk, where he died in April 1855.

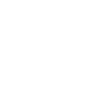
Barry, in Heraldry, the term applied to a shield which is divided transversely into four, six, or more equal parts, the tinctures of which are interchangeably disposed.



Barry.



Barry-bendy.



Barry-pily.

Barry-bendy is where the shield is divided into four, six, or more equal parts, by diagonal lines, the tincture of which it consists being varied interchangeably.

Barry-pily is where the shield is divided into an even number of pieces by piles placed horizontally across it.

Barry Cornwall. See PROCTER (BRYAN WALLER).

Bar-sur-Aube, a small town of France, in the department of Aube, situated on the right bank of the river of that name, 137 miles ESE. of Paris by rail. It has a pop. of 5000, employed in weaving and the manufacture of brandy. Here a council of the allied sovereigns was held in February 25, 1814; and here, two days after, the French were defeated by the allies.

Bar-sur-Seine, an ancient town of France, in the department of Aube, pleasantly situated on the left bank of the Seine, 21 miles SE. of Troyes by rail. Dyeing, and the manufacture of paper and brandy, are its industries. Pop. 3000.

Bartas, GUILLAUME DE SALLUSTE DU, soldier, diplomatist, and man of letters, was born at Montfort, in Armagnac, in 1544, and died in 1590 of wounds received at the battle of Ivry. His chief poem, *La Semaine*, gives an account of the creation, and is said to have had a considerable influence on Milton's *Paradise Lost*. Thirty editions of the work passed through the press in six years. Joshua Sylvester (1563-1618) Englished *Du Bartas his Divine Weeks and Works* (1598).

Barter, in commerce and political economy, a term used to express the exchange of one commodity for another, as contrasted with the sale of commodities for money. It is simply a primitive form of exchange carried on in countries in which the use of money has not yet been introduced or is not prevalent. It was an economic stage through which all communities must have passed. Even yet in many rude countries barter is very common; and European travellers find it convenient to take with them weapons, tools, and ornaments to exchange with the natives for their commodities. In civilised communities barter is a very exceptional thing, having been superseded by the use of money in various forms.

In law, barter, or exchange, as it is now more generally called in law-books, is a contract for transferring property, the consideration being some other commodity; or it may be described as a contract for the exchange of two subjects or commodities. It thus differs from *sale*, which is a contract for the transference of property in consideration of a price in *money*. See EXCHANGE; SALE OF GOODS.

Bartfa, or **Bartfeld**, a small but very old free town of North Hungary, on the river Topla, near the borders of Galicia. Its hot baths have properties like those at Spa. Pop. 5000.

Barth, a seaport town of Prussia, 21 miles W. of Stralsund, at the mouth of the Barth, which forms its harbour. Pop. (1885) 5714.

Barth, HEINRICH, one of the greatest modern scientific travellers, was born at Hamburg, 16th February 1821. He studied at Berlin, and, after visiting Italy and Sicily, in 1845 passed over to Tangier in Africa, and made excursions into the interior, to Tunis, Tripoli, and Bengazi. On his journey thence to Cairo, he was attacked, wounded, and plundered by a band of Arab robbers. He afterwards extended his researches into Egypt, Sinai, Palestine, Asia Minor, and Greece. An account of part of these travels appears in his *Wanderungen durch die Küstenländer des Mittelmeeres* (1849). He was next appointed by the British government, along with Dr Overweg, scientific companion to Mr James Richardson, at that time charged with a political and commercial mission to Central Africa. Starting from Tripoli early in 1850, Dr Barth and his companions crossed the Great Desert amid many difficulties and dangers. Barth soon separated from his friends, who both succumbed to the climate, and continued his explorations, which extended from Tripoli in the north to Adamawa in the south, and from Bagirmi in the east to Timbuktu in the west, upwards of 12,000 miles. The result of his researches appeared in his *Travels and Discoveries in Central Africa*, 5 vols. (1857-58). Afterwards he made several journeys in Greece, Turkey, and Asia Minor. He died at Berlin, November 25, 1865. In 1858 appeared a book on his travels in Asia Minor, and in 1862-66 his great

work on the vocabularies of the Central African tribes.

Barth, or BART, JEAN, a French naval hero, the son of a fisherman, born in 1651 at Dunkirk, served first in the Dutch navy under De Ruyter, but on the commencement of the war with Holland passed over to the French service. As his humble birth made promotion hopeless, he became captain of a privateer, and distinguished himself so greatly that Louis XIV. at last appointed him lieutenant of a man-of-war. In 1691 he commanded a small squadron in the North Sea, where he destroyed many English vessels, and made a descent on the coast near Newcastle. In 1694, after a desperate struggle with a superior Dutch fleet, he recaptured a large flotilla of corn-ships, and steered them safely into Dunkirk. Soon after, being caught at a disadvantage by the English, he was taken prisoner and carried to Plymouth, but he soon managed to make his escape in an open fishing-boat to France. The king received him with distinction at Versailles, but at the same time spoke continually of the mischance which had befallen him the year before. Stung by this, Barth hastened to Dunkirk, and in spite of the blockade of the harbour by the English, undertook a cruise in which he was remarkably successful. At a personal audience in 1697, Louis XIV. appointed him to the command of a squadron, on which the honest seaman bluntly thanked the king in the words: 'Sire, you have done well in this.' The courtiers were shocked at the freedom of the speech; but the king took the answer in good part, and Barth soon justified his confidence. The peace of Ryswick terminated his active career. He died at Dunkirk, April 27, 1702. His rough frankness and coarse wit, which spared neither high nor low, made him popular, no less than his boldness and readiness for battle.

Barthélemy, AUGUSTE-MARSEILLE, a French poet and politician, was born at Marseilles in 1796. Educated at the Jesuit College of Juilly, he came to Paris in 1822, and soon made himself famous by a series of vigorous and pointed political satires in verse, directed against the Bourbons, and full of suggestive regrets for the glories of the empire. In *Napoleon en Egypte* (1828), and still more in his elegy for Napoleon's son, *Le Fils de l'Homme* (1829), he spoke out his imperialism more boldly, and the latter occasioned his imprisonment on the eve of the revolution of July. His liberation of course was immediate; and along with his friend Méry, he celebrated the victory of the people in a poem dedicated to the Parisians, and entitled *L'Insurrection*. During all the changes which followed, Barthélemy was indefatigable as a brilliant versifier on the political events of the day; though, in his later years, his popularity somewhat declined. He was, from the first, a warm supporter of the second Napoleonic régime. Some of his sayings are memorable, as the oft-quoted, 'L'homme absurde est celui qui ne change jamais.' His death took place, 23d August 1867, at Marseilles, of which city he was librarian.

Barthélemy, JEAN JACQUES, a learned French antiquary, born 20th January 1716, at Cassis, in Provence. Educated for the church, he early devoted himself entirely to the study of oriental antiquities, especially numismatics, but he retained the dress and title of an abbé. In 1745 he became attached to the Royal Cabinet of Medals, and in 1753 was appointed its director. Next year he visited Rome in the suite of M. de Stainville, the French ambassador, who, as Duc de Choiseul, became French minister in 1758, and soon after, by means of a liberal pension, placed Barthélemy in a position to devote himself entirely

to learned researches, which he quietly pursued till the revolution of 1789 deprived him of his offices. In September 1793 he was imprisoned on charge of being an aristocrat, but almost immediately released. Shortly after, he was offered the situation of national librarian then vacant, but his age and infirmities compelled him to decline it. He died April 30, 1795.

His most celebrated and popular work is the *Voyage du jeune Anacharsis en Grèce dans le Milieu du quatrième Siècle avant l'Ere Chrétienne* (4 vols. 1788), which shows an extensive knowledge of the ancient world, especially of Greece and its colonies, and abounds in observations which, if not profound, are at least judicious. Later and more severe criticism has, however, pointed out many deficiencies and anachronisms. It has been translated into almost every European language. Among Barthélemy's other works may be mentioned *Réflexion sur quelques Monuments Phéniciens* (1750), and *Réflexion sur l'Alphabet et la Langue de Palmyre* (1754). The first complete edition of his works was that of Villenave (4 vols. 1821), with a biography.

Barthélemy Saint-Hilaire, JULES, French savant and statesman, was born at Paris on the 19th of August 1805. On the completion of his studies he filled for some time a subordinate office under the minister of finance, while actively contributing as a liberal publicist to such newspapers as the *Globe* and the *Nation*. About the close of 1833 he turned from political strife to quieter studies, and in 1838 was appointed to the chair of Greek and Roman Philosophy in the Collège de France. In 1839 he became a member of the Academy. The revolution of February 1848 brought him once more into the political arena. He entered the Assembly, and became one of the leaders of the moderate party. At the *coup d'état* he was one of the patriots who were arrested and flung into prison. On his release he resigned his chair, as he could not take the oath of allegiance to Napoleon III., and returned to his studies, especially Sanskrit and ancient Indian philosophy. Elected in 1871 to the Assembly at Bordeaux, he gave constant support to Thiers. In 1876 he was elected a life senator by the Assembly; and he held the portfolio of foreign affairs in Ferry's ministry, 1880-81.

His most important work is his French translation of Aristotle, various parts of which appeared from 1837 to 1883. Next to this are his contributions to western knowledge of Indian philosophy in the works, *Sur les Vedas* (1854), *Du Bouddhisme* (1855), *Le Bouddha et sa Religion* (1859), and in numerous contributions to the *Mémoires* of the Academy and the *Journal des Savants*. He has written also on the Alexandrian school, on Plato and Aristotle's philosophy as compared with modern systems, on Mohammed, and on metaphysics; whilst in 1869 he published a poetical translation of the *Iliad*.

Barthéz, PAUL JOSEPH, an illustrious French physician, was born December 11, 1734, at Montpellier, where, after serving as an army-physician, he settled as a professor, in 1785 as chancellor of the university, and where consultations with him on serious cases were sought from all parts of the civilised world. The Revolution deprived him of the greater part of his property; but Napoleon heaped honours and dignities upon him in his old age. He died October 15, 1806. Of his numerous writings, his *Nouveaux Eléments de la Science de l'Homme* (Montpell. 1778; 3d ed. Paris, 1858) was translated into most of the languages of Europe, and strongly supports the theory of vitalism and formative force.

Bartholdi, AUGUSTE, sculptor, a native of Colmar, Alsace, of Italian ancestry on his father's side, was trained in the studio of Ary Scheffer, and amongst other works has executed the Lafayette statue, New York; Vercingetorix, the Gaulish leader, now in the galleries of the French government; the 'Lion of Belfort,' and 'Grief.' That France should present to America some symbol in connection with the centenary of American independence occurred to him in 1874; the scheme took shape, and in November 1886 the gigantic bronze statue, 220 feet high, of 'Liberty enlightening the World,' which was completed in 1884, and had taken two years to get into position, was unveiled on Bedloe's Island, New York Harbour. Bartholdi received the cross of the Legion of Honour in 1887.

Bartholin, KASPAR, born in 1585 at Malmö; studied theology and philosophy at Rostock and Wittenberg, and in 1610 was made doctor of medicine at Basel. He practised for some time in Wittenberg, and in 1613 accepted an invitation to be professor of the Greek Language and of Medicine at Copenhagen, where in 1624 he became professor of Theology. He died at Sorø in 1629, after having written nearly fifty works on various subjects.—THOMAS BARTHOLIN, son of the above, and equally celebrated as a philologist, naturalist, and physician, was born in 1616. He became in 1647 professor of Mathematics at Copenhagen, and in 1648 was nominated to the chair of Anatomy. He died in 1680. He enlarged the new edition of his father's *Anatomy* (Leyd. 1641; often reprinted) with a mass of new observations, and in his own writings warmly defended Harvey's doctrine of the circulation of the blood.

Bartholomew, ST, one of the twelve apostles, supposed to be the same person as Nathanael. He was a native of Galilee, but nothing authentic is known regarding his life and labours. According to the traditionary record of Eusebius, he carried Christianity into India; Chrysostom speaks of him as a missionary in Armenia and Asia Minor. The church at Rome bearing his name claims to preserve his relics. The Roman Church holds his festival on the 24th August; the Greek on the 11th June. The primitive church possessed an apocryphal gospel under his name, but it is now lost.

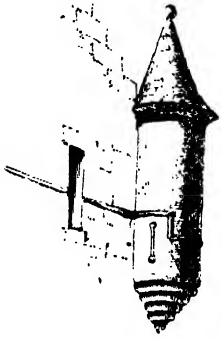
Bartholomew, MASSACRE OF ST (Fr. *La St-Barthelemy*), the appellation given to the massacre of the Huguenots in Paris on the night of St Bartholomew's Day, 24th August 1572. After the death of Francis II. in 1560, Catharine de' Medici assumed the management of affairs, as regent for her son, Charles IX., and showed throughout a more than Italian craft and faithlessness, as well as a cruelty almost without parallel in modern history. In order to annoy the Catholic party of the Duke Francis of Guise, she granted an edict of toleration to the Reformed, at whose head was the Prince of Condé. Both parties took up arms, and there ensued a war which lasted for eight years, the cruelties of which, through mutual exasperation, are almost incredible. Guise was assassinated, and Condé was taken prisoner in the battle of Jarnac and shot (1569). His nephew, young Henry of Bearn, afterwards Henry IV., then became leader of the Huguenots, along with Admiral Coligny. It was not till the strength of both sides was exhausted, that the peace of St Germain-en-Laye was concluded in 1570, whereby the Huguenots obtained the free exercise of their religion. Catharine de' Medici now expressed much friendliness towards them, and even endeavoured to lull them into negligence by the marriage of the youthful Henry of Bearn with her daughter Margaret, 18th August 1572. Admiral Coligny was drawn to Paris, and the king not only

made him costly presents, but gave him an important office in the council of state. It was all the basest hypocrisy. Which, by means of the marriage of Prince Henry, the most eminent of the Huguenots had been allured to Paris, Admiral Coligny was wounded by a shot from a window of the palace on 22d August 1572. The king, indeed, hastened to him, and swore to avenge him; but, on the very same day, the king was persuaded by his mother that the admiral sought his life. 'By God's death!' he exclaimed, 'let the admiral be slain, and not him only, but all the Huguenots, till not one remains that can give us trouble.' That night Catharine held a council, and appointed St Bartholomew's Day for carrying into effect the long-contemplated massacre. After Coligny had been murdered, a bell in the tower of the royal palace, at the hour of midnight, gave the signal to the assembled companies of citizens for a general massacre of the Huguenots, in which it is estimated that over 4000 perished. The king himself is popularly represented as having fired from his palace upon those that were fleeing past. The Prince of Condé and the king of Navarre only saved their lives by going to mass, and appearing to conform to the Catholic church. The provinces were at the same time summoned to similar slaughter; and although in some of them the officials were ashamed to publish the murderous commands which had been transmitted to them, there were found bloodthirsty fanatics enough, who perpetrated the greatest horrors for several weeks together in almost all the provinces, so that it was reckoned that 30,000 (some authorities make the number 70,000) persons were murdered. The pope celebrated the events of St Bartholomew's Day by a procession to the church of St Louis, a grand *Te Deum*, the striking of a medal, and the proclamation of a year of jubilee. Yet the crime was useless. The Huguenots had lost their chiefs, but, the first moment of stupor past, they took up arms with all the fury of despair. The royal troops were once more foiled in their attempts to take Rochelle; and Charles found himself forced to grant liberty of conscience to the Huguenots, at the very moment in which he was receiving for the massacre the enthusiastic congratulations of the courts of Rome and Spain. See White's *Massacre of St Bartholomew* (1867), and the works cited at HUGUENOTS.

Bartholomew Fair, held at West Smithfield, London, from 1133 till 1855, the charter for it having been granted by Henry I. to a monk named Rahere, who had been his jester, and had founded the priory of St Bartholomew (see below). The fair was held annually at the festival of St Bartholomew (August 24, old style); but in 1753, owing to the alteration of the calendar, it was for the first time proclaimed on 3d September, having in 1691 been curtailed from fourteen to four days. In the first centuries of its existence, Bartholomew Fair was one of the great annual markets of the nation, and the chief cloth-fair of the kingdom. Its articles of traffic were besides cloth stuffs, leather, pewter, and live-stock; while it was rendered attractive to the crowds that attended it by a variety of popular amusements. All manner of shows, exhibitions, theatrical booths, &c. thronged the fair; and tumblers, acrobats, stilt-walkers, mimmers, mountebanks, and merry-andrews resorted to it in great numbers. In 1685 the fair was leased by the city to the sword-bearer, and thenceforth it began to decay as a place of trade. In 1840 the exhibitions were removed to Islington; in 1850 the last proclamation by the lord mayor took place, and in 1855 the once famous fair came to an end. See Professor H. Morley's *Memoirs of Bartholomew Fair* (1859).

Bartholomew's (St) HOSPITAL, Smithfield, London, was founded in 1123 by Rahere, the first prior of the Convent of Augustinian Canons, which he also founded on Smithfield. An ancient chapel originally dedicated to the Holy Cross is now the parish church of St Bartholomew the Less. The hospital received fresh charters in 1544 and in 1547, escaped the fire of 1666, and was rebuilt in 1729. The endowment has been enlarged from public and private sources, and the revenues are large and ample. The hospital contains 675 beds, and affords relief to about 150,000 patients annually. There is a thriving medical school attached, attended by about 400 students; also a convalescent home attached to the hospital, containing 75 beds, at Swanley, Kent.

Bar'tizan, a small, overhanging, battlemented, parapet turret, projecting from the angles on the top of a tower. It was generally pierced with apertures for cross-bowmen, called *ballistraria*. Dr Murray in his Dictionary says that the word is a spurious 'modern antique,' which had no existence in the times to which it is attributed. It was apparently first used by Sir Walter Scott, and was due to a misconception of a 17th-century illiterate Scotch spelling, *bertiscne*, for 'bertising'—i.e. *bretising*, or *bratticing*, a *brattice* being a battlemented parapet, originally of wood, and temporary.



Bartizan.

Bartlett, JOHN RUSSELL, American author, was born at Providence, Rhode Island, U.S., 23d October 1805. For a time in a banking-house there, in 1837 he became a bookseller in New York, giving his leisure to history and ethnology. He assisted in founding the American Ethnological Society, and was secretary of the New York Historical Society. He was employed by the United States government in 1850-53 as a commissioner for determining the Mexican boundary-line, and in 1854 published an account of his explorations and adventures in that capacity. In 1855 he became Secretary of State of Rhode Island, and in 1861-62 he was its acting governor. He was the author of *The Progress of Ethnology*, a *Dictionary of Americanisms* (enlarged ed. 1878), *Princered Man* (1868), *Bibliotheca Americana* (4 vols. 1865-70), &c. He died 28th May 1886.

Bartlett, WILLIAM HENRY, artist, born in London in 1809, was a pupil of Britton, the architect, who afterwards employed him to make drawings for his *Cathedral Antiquities* and *Picturesque Antiquities of English Cities*. Subsequently Bartlett visited the Continent, the Holy Land, and America several times, on each occasion enriching his portfolio with innumerable interesting scenes. No fewer than nineteen quarto volumes, containing about 1000 engravings from his sketches, and letter-press from his own pen and those of his fellow-travellers, Dr W. Beattie, N. P. Willis, and Miss Parloe, were devoted to these countries. Bartlett died on the voyage from Malta to Marseilles, 13th September 1854.

Bar'toli, TADDEO, an Italian painter of the Siennese school (1362-1422).—DANTELO BARTOLI, a learned Jesuit, was born at Ferrara in 1608, and died rector of the Jesuit College at Rome in 1685. His chief work is the *Istoria della Compagnia di*

Gesù (1653-73).—PIETRO SANTO BARTOLI (sometimes called 'Perugino'), born 1635, died 1700. He was a painter after the manner of Poussin, and a skilful etcher.

Bartoli'ni, LORENZO, a celebrated Italian sculptor, was born at Vernio, in Tuscany, in 1777, and came to Paris while still a young man. His chief patron was Napoleon, who in 1808 sent him to Carrara, to establish a school of sculpture. After the battle of Waterloo he repaired to Florence, where he died in 1850. Besides an immense number of busts, he produced several groups, the most celebrated of which are his 'Charity' and 'Hercules and Lycus.'

Bartolomme'o, FRA (properly Baccio della Porta), one of the most distinguished masters of the Florentine school of painting, was born at Florence, in Tuscany, in 1469. His first teacher was Cosimo Roselli; but he owed his higher cultivation to the study of the works of Leonardo da Vinci. His subjects are mostly religious, and by far the greater part of his pieces belong to the later years of his life. He was a warm adherent of Savonarola, after whose tragical end he in 1500 assumed the monkish habit. The visit of the young Raphael to Florence in 1504 seems to have been instrumental in stimulating him to resume his art. He imparted to Raphael his knowledge of colouring, and acquired from him a more perfect knowledge of perspective. The two remained constant friends—Bartolommeo on one occasion finishing certain of Raphael's unfinished works, Raphael performing a like kindness for him at another time. Bartolommeo died at Florence, 1517. The greater number of his works are to be seen at Florence, in the gallery of the Pitti Palace, but the Louvre possesses a fine 'Annunciation' by him. See Frantz, *Fra Bartolommeo della Porta* (Ratisbon, 1879); and Leader Scott, *Fra Bartolommeo* (Lond. 1880).

Bartolozzi, FRANCESCO, an eminent engraver, was born in Florence, September 21, 1727. After practising his art under Joseph Wagner at Venice, he went to Rome, where he executed his admired plates from the life of St Vitus. He was afterwards commissioned by Mr Dalton, librarian of George III., to engrave a series of drawings by Guercino, and was induced by the same patron to settle in England. Here Bartolozzi produced his exquisite line engravings of 'The Silence' and 'Clytie,' after Annibale Carracci, which entitle him to occupy the front rank in his profession. He also engraved numerous specimens of the works of his friend Giovanni Cipriani, of Michael Angelo, Carlo Dolei, Sirano, and others, with equal truth and effect. He likewise enriched Alderman Boydell's Shakespeare Gallery with many fine engravings. In 1769, on the formation of the Royal Academy, Bartolozzi was nominated one of the original members, and executed, from a design by his friend Cipriani, the diploma, which is still in use, and ranks as one of his masterpieces. In 1802 he accepted a flattering invitation from the Prince Regent of Portugal, to take the superintendence of a school of engravers at Lisbon, whither he repaired three years afterwards in his seventy-eighth year, and there resided until his death, March 7, 1815. He was the grandfather of the celebrated actress, Madame Vestris. His prints are said to be more numerous than those of any engraver, home or foreign; and include line engravings and stippled works, printed in brown and red. See *Bartolozzi and his Works*, by Tuer (2 vols. 1882), where the dates of his birth and death, about which a singular diversity of opinion appears to have existed, are verified.

Barton, ANDREW, a famous Scottish naval commander of the time of James IV., was killed

in an engagement with two English ships in the Downs, 2d August 1511.

Barton, BENJAMIN SMITH (1766-1815), American naturalist and medical practitioner, studied the natural sciences and medicine in Philadelphia, Edinburgh, and London (1782-88), and took his degree at Göttingen. He practised medicine in Philadelphia, and held successively the chairs of Botany and Natural History, Materia Medica, and Theory and Practice of Medicine in the university there. He became president of many learned societies, was a correspondent of Humboldt, and amongst other works wrote *Elements of Botany* (1812-14); *Collections for an Essay toward a Materia Medica of the United States* (3d ed. 1810); and *Flora Virginica* (1812).

Barton, BERNARD, the Quaker poet, was born at Carlisle in 1784. In 1809 he became clerk to a bank at Woodbridge, a post which he held till within two days of his death, 19th February 1849. His *Musical Effusions* (1812) brought him into correspondence with Southey; whilst *Poems by an Amateur* (1818), *Poems* (1820), and several more volumes of verse, increased his reputation, and gained him the friendship of Byron and Lamb. His devotional poems have an echo of George Herbert, and some of his lyrics are graceful; but he is on the whole less a poet than a versifier, easy and pleasant withal. Lamb's advice to him was sound, 'Keep to your bank, and your bank will keep you'; and by Lamb's advice it was that he accepted the sum of £1200, raised by some Quaker friends in 1824. See his *Poems and Letters* (1849), selected by his daughter, with a memoir by Edward Fitzgerald.

Barton, ELIZABETH, commonly called the nun or maid of Kent, was born in 1506. About the year 1525, when a domestic servant at Aldington in Kent, she had an illness, in the course of recovery from which she fell into a strange state of nervous derangement and religious mania, in which she uttered hysterical ravings. When her illness left her, she still continued her trances and prophetic utterances, which drew so much attention that Archbishop Warham directed that two monks should be sent to examine her. One of these, Edward Bocking, at once saw in her abnormal faculties a rare opportunity for reviving popular respect for the Catholic church. He instructed her carefully in the controversial points between his church and the Protestants, as well as in the legends of the saints, and persuaded her to give herself out as directly inspired by the Virgin. Soon afterwards she became an inmate of the priory of St Sepulchre at Canterbury, but Bocking continued to be her close attendant and the inspirer of her prophecies and revelations. As soon as the divorce of Henry VIII. began to be discussed, the nun denounced it 'in the name and by the authority of God,' and threatened the king with death if he persisted in his purpose. Archbishop Warham was convinced by her earnestness, the astute Wolsey gave her an audience, Sir Thomas More listened to her more than once with interest, and Bishop Fisher wept with joy over her revelations. The king's marriage to Anne Boleyn (1533) and his subsequent immunity from the awful consequences so confidently foretold destroyed her credit; and, meantime, her friend Warham had died, and Crammer reigned in his room. She was soon 'put to the question,' and repeated examinations drew a full confession from her in September of the same year that 'she never had visions in all her life, but all that she ever said was feigned of her own imagination only, to satisfy the minds of those which resorted to her, and to obtain worldly praise.'

After the humiliation of a public recantation, she was committed to prison; but soon after the close of the year was put on trial for high treason, condemned and executed at Tyburn with Bocking and four other accomplices on the 20th of April 1534. In her dying speech the nun described herself as 'a poor wench without learning,' who had been puffed up by praises to her own undoing and that of her companions.

Barton Clay is the name given to a series of beds which form the upper division of the Eocene of the Hampshire basin. These beds are well exposed in the cliffs of Hordwell, Barton, and in the Isle of Wight. They are believed to be the equivalents in age of the Upper Bagshot Sands of the London basin.

Barton-upon-Humber, an ancient town of Lincolnshire, on the south side of the Humber, 7½ miles SW. of Hull. Pop. (1861) 3797; (1881) 5339.

Baru, a fine woolly substance found at the base of the leaves of the *Saguerus saccharifer* (also called *Arecnga saccharifera*), one of the sago-palms of the Indian Archipelago. It is employed in calking ships, in stuffing cushions, and for other similar purposes.

Baruch ('the Blessed'), the son of Neriah, the faithful friend and secretary of the prophet Jeremiah. During the siege of Jerusalem by Nebuchadnezzar he was flung into prison along with the prophet, and found release only on the fall of the city (586 B.C.). He afterwards accompanied his master to Egypt, but of his after-life nothing certain is known. An apocryphal work in the Greek language has come down to us bearing his name, which contains in noble and glowing language a promise of future glory for Israel, and predicts the rebuilding of Jerusalem. There is usually appended to it, as chapter vi., a letter of the prophet Jeremiah to the exiles in Babylon. The book of Baruch is the only book in the Apocrypha resembling the Prophets. It was held in little esteem by the Jews, and it is not until the time of Irenaeus that it is quoted by Christian writers either in the East or West. It seems most probable that the present book was worked up by an Alexandrine editor, perhaps from an original Hebrew fragment.

Barwood. See CAMWOOD.

Barye, ANTOINE LOUIS, a French sculptor, distinguished mainly for his bronze statues of animals and animal-groups, was born at Paris, 24th September 1795, and was at first an engraver and metal-worker. His famous bronze of a lion struggling with a snake secured for him the cross of the Legion of Honour. He died 27th June 1875.

Bary'ta, or BARYTES, or Oxide of Barium (q.v.):—symbol BaO is the earth present in the minerals *witherite* (carbonate of barium) and *heavy spar* (sulphate of barium). It may be prepared in several ways: (1) By acting upon the carbonate of baryta, BaCO₃, by nitric acid, HNO₃, which causes the disengagement of the carbonic acid, CO₂, and the nitric acid combining with the baryta forms the nitrate of barium, Ba(NO₃)₂. On evaporating the latter substance to dryness, and igniting the residue, the nitric acid volatilises, and leaves the baryta, BaO. (2) Another mode of preparing the same substance is to act upon a solution of sulphide of barium, BaS, by the black oxide of copper, CuO, when an interchange of elements occurs, the sulphur uniting with the copper, producing sulphide of copper, Cu₂S, and the oxygen with the barium, forming baryta, BaO, which remains dissolved in the water, and, on evaporation, deposits crystals in the hydrated condition, BaH₂O₂.8H₂O. Baryta belongs to the group of

alkaline earths, and has the property of acting like an Alkali (q.v.) on colouring matters. It has a very harsh taste, is highly caustic, and is very poisonous. The presence of carbonic acid gas may be detected by exposing a solution of baryta to the air, when carbonic acid combines with the baryta and forms a film of white carbonate of barium, BaCO_3 . Baryta exposed to air or oxygen absorbs oxygen, forming peroxide of barium. On this being heated, oxygen is liberated and baryta again produced. Till lately it was found impossible to procure oxygen by this simple method, as the action became weak when the process was repeated. But recently it has been found that by carefully removing all carbonic acid gas and water from the air before passing it over the



Crystal of Sulphate of Baryta.

barium, the difficulty is removed, and oxygen is thus economically produced. The *sulphate of baryta*, BaSO_4 , otherwise called *ponderous* or *heavy spar*, is found in fissures or cracks in other rocks. It is crystalline, and is sometimes found pure and white, but generally presents a flesh-red colour, from the red oxide of iron (rust) incorporated in it. The rust can be got quit of by reducing the sulphate of baryta to a fine powder under rollers or travelling-wheels, and subjecting the pulverised material to the action of dilute sulphuric acid, which dissolves the oxide of iron, and leaves the sulphate of baryta as a white dense powder. The principal use of *heavy spar* is as a pigment under the name of *permanent white*; but having little opacity, it cannot be employed by itself, but only when mixed with ordinary white-lead. When added to the latter, however, it must be regarded as an adulteration, for the little opacity it possesses renders it of service only as an increaser of the bulk of the white-lead. Several mixtures of sulphate of baryta and white-lead are manufactured, and are known in commerce. *Venice White* contains 1 part sulphate of baryta and 1 part white-lead. *Hamburg White* contains 2 parts sulphate of baryta and 1 part white-lead. *Dutch White* contains 3 parts sulphate of baryta and 1 part white-lead. The native sulphate of baryta has been employed by the celebrated potter Wedgwood in the manufacture of jasper ware, and for the formation of white figures, &c. on coloured jars and vessels. The *carbonate of baryta* found native as *witherite*, and the *nitrate of baryta*, have been previously referred to in this article and that on BARIUM.

Baryton (Viola di Bardone), an old chamber-instrument, somewhat like the viol di gamba in tone: had a broader finger-board, with six or seven gut-strings, while under the neck there were from nine to twenty-four strings of brass wire, which were pinched with the point of the thumb, to produce a sound, while the gut-strings were acted on by a bow. For the baryton voi see BARTONE.

Bas, or **Batz**, a small island in the English Channel, belonging to France, and situated off the north coast of the department of Finistère. Its length is about $2\frac{1}{2}$ miles, and its breadth about 1½ mile. It has three villages; a fine haven, that of Kernoe, and a lighthouse. Pop. about 1200, whose chief occupation is fishing.

Basalt. Basalt-rocks are of igneous origin, and are composed essentially of plagioclase

felspar, augite, olivine, and generally magnetite or titaniferous iron. They show all varieties of texture, from smooth-compact up to coarsely crystalline, and vary in colour from pale blue up to dark-grayish blue, brownish, and black. The vitreous varieties are *Tachylite* and *Hyalomelane*; compact or crypto-crystalline varieties are termed *Basalt*; fine-grained kinds are called *Anamesite*; while *Dolerite* is the name given to the more coarsely crystalline kinds. Seen under the microscope, the compact and fine-grained basalt-rocks often show a certain proportion of glassy or devitrified matter lying between the various crystalline minerals of which the rock is chiefly composed. Basalt-rocks are often vesicular and amygdaloidal. Sometimes they occur as lava-flows, at other times they appear as intrusive sheets, dikes, and masses. They are of common occurrence in Britain, more especially in Scotland. As examples of lava-form basalt-rocks may be cited those of Mull, Staffa, and other islands of the Inner Hebrides. Similar lava-form basalt-rocks are well developed in Antrim. Intrusive basalt-rocks are abundant in Central Scotland—Salisbury Craigs, Edinburgh Castle Rock, Dalmahoy Craigs, Abbey Craig, &c. are examples.

The older basalt-rocks have frequently undergone some changes, owing to the chemical action of percolating water. Such altered rocks have often a dull greenish colour, the greenish tinge being due to the conversion of the augite and olivine into green serpentinous and chloritic products. Such more or less altered varieties of basalt-rock sometimes acquire special names—the finer-grained kinds being called *metaphyre*, and the coarser-grained ones *diabase*. When basalt-rocks have been intruded amongst coals or black shales, they often become gray, white, or yellow in colour, and assume a dull earthy appearance. This is the so-called *white-trap*.

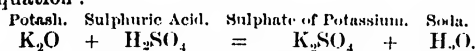
There are volcanic masses of Tertiary age which occur in such regions as the Thüringer Wald, Erzgebirge, the Eifel, Italy, &c. which closely resemble basalt-rocks. In these rocks, however, the minerals nepheline and leucite play the part of plagioclase felspar. The rocks, therefore, are known as *nepheline basalt* and *leucite-basalt*, to distinguish them from ordinary basalt, or, as it is sometimes called, *plagioclase-basalt*. The latter ranges in age from Lower Carboniferous times at least, up to the present; the former are not as yet known from any older stage than the Tertiary.

Basalt-rocks, especially the compact varieties, often assume a columnar structure. This structure, however, is not confined to basalt-rocks. The columns vary in the number of their angles from 3 to 12, but they have most commonly from 5 to 7 sides. In some cases they are more or less perfectly hexagonal. They are generally divided transversely by joints at tolerably equal distances, and in the case of the more perfectly columnar rocks, these joints often show at each articulation a cup and ball socket. The columns are always arranged at right angles to the planes of cooling, so that in the case of an approximately horizontal bed or sheet the columns are vertical, while in the case of a vertical dike, they are horizontal. Various explanations of this remarkable structure have been advocated, none of which can be said to be perfectly satisfactory. The general belief, however, is that they are the result of contraction upon cooling. Two of the best known and finest examples of columnar structure in basalt-rocks are Fingal's Cave in the island of Staffa (q.v.), on the west coast of Scotland, and the Giants' Causeway (q.v.), on the north coast of Ireland.

Basalt-rocks, owing to their toughness and

hardness, and to the fact that their mineral ingredients yield unequally, are much employed for causeway-stones and 'road-metal.'

Base, in Chemistry, is a term applied to a compound body, generally consisting of a metal united with oxygen. Thus, the metal potassium, K, when it combines with oxygen, O, forms the oxide K_2O , which unites with water, yielding the base potash, or caustic potash, KOH; and similarly lead, Pb, and oxygen, yield the base oxide of lead, or litharge, PbO. A distinguishing feature of a base is that it is capable of entering into double decomposition with an acid, more or less neutralising its acid properties, and forming a Salt (q.v.) and water. Thus, the base potash combines with sulphuric acid to form the salt, sulphate of potash, and water, as represented by the following equation:



So also potash and nitric acid, HNO_3 , yield the salt nitrate of potassium, or nitre, KNO_3 . Occasionally sulphur replaces the oxygen in a base. Thus, the metal potassium, K, unites with sulphur, S, to form the *sulphur* base, sulphide of potassium, K_2S , which can unite with a sulphur acid like sulpharsenious acid or orpiment, As_2S_3 , to make the salt sulpharsenite of potash, K_2S, As_2S_3 . The metal half of a base need not be a simple element, but may be a compound body which, for the time, plays the part of a simple substance. Thus, the compound ethyl, C_2H_5 , can combine with oxygen to form ordinary ether, $(C_2H_5)_2O$; and the base thus produced can, in its turn, combine with acids to form salts. A base may be soluble or insoluble in water. Thus, the bases potash, K_2O , soda, Na_2O , ammonia, NH_4HO , baryta, BaO , strontia, SrO , lime, CaO , and magnesia, MgO , are more or less soluble in water; whilst the oxide of iron or rust, Fe_2O_3 , and the red oxide of mercury, HgO , are insoluble in water, but soluble in acids. For *organic* bases, &c., see ALKALIES, ALKALOIDS, and AMINES.

Base, in Architecture, the foot or lower member of a pillar, on which the shaft rests. See COLUMN.

Base, in Heraldry, the lower portion of the shield. Any figure placed on it is said to be in base. A small portion of the base of a shield parted off by a horizontal line (sometimes called a base).

Base-ball. The American national game of base-ball is an evolution from the old English schoolboy game of Rounders; but, unlike the boyish pastime from which it had its origin, it requires mainly qualities to excel in it. In base-ball, as in rounders, the players use a bat and a ball, and run around bases, but there all resemblance between the two games ceases. As the game of base-ball is now played, it is full of excitement, and is engaged in with equal zest by schoolboys on an open field, and by trained professional experts on inclosed grounds, presenting to the latter full scope for the exercise of those mental and physical attributes which mark the intelligent and practised athlete.

Cricket and base-ball are coupled in Miss Austen's *Northing Abbey*, which was written about 1798. In the States, the Knickerbocker Club was founded at New York in 1845, the Excelsior Club at Brooklyn in 1860; but it was not till 1865 that the game became universal.

The theory of base-ball may be briefly summed up as follows: A space of ground, in the form of a diamond, 90 feet square, is marked out on a level field of three or four acres in extent. Bases are

placed on or within each angle of the diamond, and are called respectively *home*, *first*, *second*, and *third* bases. Each team consists of nine players; and the home team has the choice of first innings, its members taking the bat in regular succession. The man at the bat is termed the batsman, or striker, and his side may be regarded as the defensive force,

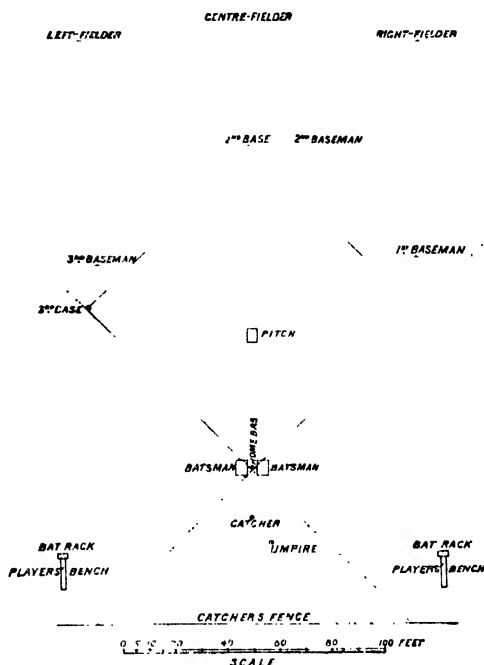


Fig. 1. - Diagram of Base-ball Ground.

the field side being the attacking party. The several members of the latter party are disposed as follows: The pitcher, near the centre of the diamond; the catcher, behind the home base; the first baseman, near the first base, to the right of the catcher; the second and third basemen, near the second and third bases; and about midway between these, the short-stop; with out-fielders at right, centre, and left fields, more or less in line with first, second, and third bases respectively.

When the fielding side take their positions and the play begins, the pitcher delivers the ball, a fair ball being one that passes over the home base, and not lower than the batsman's knee nor higher than his shoulder. Such a ball counts a strike, whether the batsman strikes at it or not, and after four fair balls the striker is obliged to run, or is put out; but, on the other hand, five unfair balls delivered by the pitcher entitle the batsman to a base. The batsman endeavours to send the ball out of the reach of the fielders, and far enough out in the field to enable him to make the round of the four bases without being put out, in which case he scores a run. Each base, however, is a resting-place, and he may stop on any base until either he sees an opportunity to steal to the next, or a succeeding batsman sends the ball far enough to enable him to run with safety—for, except when occupying a base, the runner touched with the ball by a fielder is out. All three bases may thus be occupied at once; but when the next batsman becomes a base-runner, the runner on first base must pass on to second base, which must be vacated to receive him, otherwise he is put out. This rule and another, obliging runners to return and touch the base last

occupied when a striker's ball is caught before touching the ground, afford scope for 'double-play,' as a fielder may catch the striker out, and then throw the ball to a base-keeper before another of the same side who is running bases can return. A batsman can only run on a fair hit, which is a ball batted within the lines of the diamond between the home and first and third bases, or continuations of them marked in white on the grass; but he may be caught out on a foul hit just as on a fair, and if, after a fair hit or four strikes, the ball is fielded to first base before he arrives there, he is out. The first striker is followed by others in rotation at the bat, until three of the batting side are put out, when the field side take their turn at the bat. This goes on until nine equal innings have been played, and then the side scoring the most runs wins the game. It will be readily seen that the theory of the game is very simple, and it is this simplicity of construction which forms one of its chief attractions; and yet to excel in the playing of all the points of the game requires not only the possession of the physical attributes of endurance, agility, and strength, together with good throwing and running powers, and plenty of courage, pluck, and nerve, but also the mental powers of quick perception, thorough control of temper, and the presence of mind to act promptly in critical emergencies of the game.

The weight of the ball used is 5 to 5½ ounces, its circumference 9 to 9½ inches; and it is much more elastic than a cricket ball. The bat is round, not more than 2½ inches in diameter at the thickest part, and must not exceed 42 inches in length.

Fig. 2.—Base-ball Bat.

The ball is delivered by the pitcher with great swiftness, an underhand throw being allowable and very generally employed; and this high speed attained enables a skilful player to send the ball with such a twist or *curve* as will deceive the batsman, and make him think a fair ball bad and an unfair ball good. This effect is obtained by the resistance offered to the ball by the air, and a rotary motion of the ball on its own axis, supplied by the pitcher; and the direction of the curve is determined by the manner in which the ball is delivered from his hand. Curved pitching has been brought to considerable perfection of late years, but a certain want of accuracy makes it advisable for the catcher, when playing close behind the batsman, to wear a strong wire mask, and has produced a rule entitling a batsman who is struck by the ball to take his first base therefor. Prior to 1887, there were no less than four special professional codes of playing rules in use, besides those governing amateurs; but since the beginning of that year, the game has been played under a set of 'National Rules,' agreed to by all players.

The great popularity of base-ball in America has led to the establishment of regular stock-companies, employing a large amount of capital in the business of 'running' professional club teams, whilst the outlay each season reaches in the aggregate to over a million of dollars. The principal contests for the championship of the United States have sometimes led to gatherings of spectators numbering ten thousand or more, each paying half a dollar admission to the inclosed grounds; and in one instance, in New York City in 1886, over thirty thousand spectators witnessed one of the championship matches. The expense of organising a first-class

professional team frequently reaches thirty thousand dollars. During 1886 nearly three thousand professional contests took place. What with the college clubs and the amateur organisations of the country, it is safe to say that hundreds of thousands of young men participate in base-ball games during each season, from April to October.

Basedow, JOHANN BERNHARD, educationist, was born 11th September 1723, at Hamburg, where his father was a peruke-maker. In the year 1753 he was appointed a master in an academy at Soröe. In 1761 he was removed from the gymnasium at Altona on account of heterodox opinions. Rousseau's *Emile* awakened in him, in 1762, the thought of improving the method of education, and of reducing to practice Rousseau's maxims and those of Comenius. Contributions from princes and private persons, amounting to 15,000 thalers (about £2200), covered the cost of his *Elementarwerk*, which was illustrated with 100 copperplates, and was intended to bring the minds of children into contact with realities, and not mere words. As a model school on this method, he established in 1774 the *Philanthropin* at Dessau; but his restlessness of disposition, and his quarrels with his colleagues, led to his withdrawal, and it was finally shut up in 1793. Basedow died at Magdeburg, July 25, 1790. His influence on the public mind of his age, particularly in Germany, was very great, and his numerous works powerfully awakened attention and interest in the much-neglected subject of education. See his *Life* by Meyer (2 vols. Hamburg, 1792).

Bas'el (Fr. *Bâle*; older Fr. *Basle*), a city and canton of Switzerland. The canton was divided in 1833 into two independent half-cantons, called *Basel-city* and *Basel-country*. The urban half-canton consists only of the city, with its precincts, and three villages on the right bank of the Rhine; the remainder forms the half-canton of *Basel-country*. The canton of *Basel* borders on Alsace-Lorraine and Baden, and has an area of 177 sq. m.—but little larger than the county of Rutland. Lying on the northern slope of the Jura, it is a country of hills and valleys. The mountains attain an elevation of over 3400 feet. The chief rivers of *Basel* are the Rhine and its tributaries, the Birz and Ergolz. The soil is fertile and well cultivated. The climate, except in elevated situations, is very mild. The inhabitants are chiefly employed in agriculture, the cultivation of fruit-trees and of the vine, cattle-husbandry, fishing, salt-works, the manufacture of ribbons (to the value of almost £2,000,000 annually), woollens, linens, and leather.

The city of *Basel* arose out of a Roman fortified post, known as *Basilia* after an imperial visit in 374. From an early period it was the seat of a bishop, and in the beginning of the 10th century the Emperor Henry I. rebuilt the town, which then became a place of importance, and after 1032 formed part of the German empire. The centuries that follow are marked by a steady extension of the authority of the burghers, whose repeated efforts to break the power of the bishop and the nobles fills up the history of the period. Involved in many feuds with the House of Hapsburg, *Basel* formally joined the Swiss Confederacy in 1501. From 1510 onwards, Luther's writings were printed here; and at the end of twenty years from that time, the reformed doctrine had become generally prevalent. After the union with Switzerland, the triumph of the burgher party became also more complete; but the peace of the city was often disturbed by strife caused by the assertion of undue authority by the magistrates. All parties in the city, however, combined against the country district; and persons

belonging to the city were appointed to all offices, civil and ecclesiastical. Under the impulse communicated by the French Revolution, equality of rights was conceded in 1798; but in 1814 the new constitution made the city again supreme. After unsuccessful attempts to obtain redress of grievances by petition, civil war broke out in 1831, which did not cease till the troops of the Swiss Confederation took possession of the canton, and the diet recognised the separation of the city and the country district in 1833. The constitutions of the two half-cantons are in most respects similar, and are framed on the basis of the old constitution, modified in accordance with the principle of universal suffrage. According to the census of 1880, the half-canton of Basel-city contained 65,101 inhabitants, of whom 44,236 were Protestants; and Basel-country, 59,271, of whom 46,670 were Protestants. The capital of Basel-country is Liestal. Both Roman Catholic and Protestant clergy are paid by the state, and the parishes of the Reformed Church have received the right of choosing their own pastors.

The city of Basel was much more important in the middle ages than now; and this though its population has grown from 29,555 in 1850 to 68,992 in 1885. In the 14th century, the number of its inhabitants was greatly reduced by the plague, or 'Black Death' (q.v.), which raged in it with terrible severity, and is sometimes mentioned as the 'death of Basel.' The town is well built and clean, but its appearance does not proclaim it the wealthiest city in Switzerland, as it is. The Rhine, here spanned by three bridges, 200 yards long, divides the city into two parts: Great Basel on the south side, and Little Basel on the north. The minster, a cathedral till 1528, was founded by the Emperor Henry II. in 1010, but not completed till 1500. It was restored in 1852-56, and has two conspicuous towers, 218 feet high. Other buildings are the town-hall (1508); the university, founded in 1460; a museum, in which there are thirty-two pictures by the younger Holbein, who lived thirteen years in Basel, though a native he was not; and a public university library of 160,000 volumes and 4000 manuscripts. During the Reformation, the university was a central point of spiritual life, and it has numbered among its professors men of great eminence in learning and science, including Erasmus and (Æcolampadius, both of whom died here, and the mathematicians Euler and Bernoulli, who were natives of Basel. It has now some 70 professors and lecturers, and about 300 students. -At Basel was concluded on 5th April and 22d July 1795 a treaty between the French Republic, Prussia, and Spain, Prussia withdrawing from the coalition against France.

Basel, COUNCIL OF (1431-43), the last of the three great reforming councils of the 15th century, was summoned by Pope Martin V., and opened under his successor Eugenius IV., 23d July 1431. Its first session was held at Basel on 14th December 1431. Instead of the method followed at Constance, where the members deliberated and voted by nations, the council was divided into four departments, each with its own organisation, and each investigating a special class of subjects, its decision and reasons being communicated to the others. If three agreed in their opinions, the matter was brought before the whole council for final discussion and judgment. In this way the influence and intrigues of the Italian bishops were neutralised. The council addressed itself to the reconciliation of the Hussites, and to the reform of abuses in the church itself. But the first attempt to conciliate the Hussites was met with resistance by the pope, who not only refused his sanction, but empowered the cardinal legate to dissolve

the council. The council strongly repelled the pope's pretension of right to dissolve it, and proceeded with its business. His injunctions that it should remove to Italy were equally disregarded. It renewed the decree of the Council of Constance, asserting the right of a General Council to exercise authority over the pope himself, and on his persevering to issue bulls for its dissolution, caused a formal process to be commenced against him, and cited him to appear at its bar. It assumed the papal powers, and exercised them in France and Germany, where its authority was acknowledged. It concluded a peace, in name of the church, with the Calixtines, the most powerful section of the Hussites, by the Pragmatic Compact of 20th November 1433, granting them the use of the cup in the Lord's Supper. At length, Eugenius IV., being hard pressed by insurrections in the States of the Church, and afraid of losing his whole influence in France and Germany, solemnly ratified all its decrees, by a bull dated 15th December 1433. Desirous, however, of limiting the papal prerogatives, the council restricted the power of granting interdicts, abolished *annates* and other grievous exactions, and prohibited the bestowal of reversions to ecclesiastical offices. It also appointed punishments for certain immoralities in the clergy, and prohibited Festivals of Fools, and all the indecorous proceedings which had been commonly practised in churches at Christmas; and it adopted decrees concerning the election of popes, and for the regulation of the College of Cardinals.

At this time, a prospect was opened up of the union of the distressed Greeks with the Church of Rome, and a council was proposed to this end. The Basel fathers refused to meet in Ferrara, and having again cited the pope to its bar, not only, on his failing to appear, declared him contumacious, but on his opening an opposition council at Ferrara, went so far as, on January 24, 1438, to decree his suspension from the functions of his office. His party, however, was so strong that this decree could not be carried into effect; and the cardinal legate, with the greater number of the Italians, left Basel, and went over to his side. All the more resolutely did Cardinal Louis Allemand, Archbishop of Arles, a man of high courage and eloquence, now guide the proceedings of the council, which on May 16, 1439, declared the pope a heretic, for his obstinate disobedience to its decrees; and in the following session, formally deposed him for simony, perjury, and other offences. On November 5, 1439, it elected Duke Amadeus of Savoy to be pope, who styled himself Felix V., but was recognised only by a few princes, cities, and universities. France and Germany accepted the reforming decrees of the council, but remained neutral in the question regarding the popedom. The friendship of the Emperor Frederick III. strengthened the party of Eugenius; and the council gradually melted away, and its members, after three years of inactivity, held its last session at Basel on May 16, 1443, and removed its seat to Lausanne. Here a few prelates still remained together under the presidency of Cardinal Allemand, till in 1449, after the death of Eugenius, and the resignation of the antipope Felix, a compromise was effected, by which the fathers directed the church to obey the new pope, Nicholas V., who in return confirmed the acts of the council. Thus ended the last attempt to reform the church from within, and on its old basis. The Basel reforming decrees are contained in no Roman Catholic collection, and are held to be invalid by the canonists of Rome; yet they are of authority in canon law in France and Germany, although their application has been modified by recent concordats. See vol. vii. of Hefele's *Konstanzgeschichte* (Freiburg, 1869).

Base-line. See ORDNANCE SURVEY.

Basella, a tropical genus of Chenopodiaceæ (q.v.). *B. alba* and *B. rubra* are known in Britain as stove biennials. They are plants with twining stems, in common use as pot-herbs in the East Indies, and cultivated in China; also sometimes in France as a substitute for spinach. *B. rubra* yields a rich purple dye. The great fleshy root of *B. tuberosa*, a South American twiner, is edible.

Base of Operations, in warfare, is the receiving depôt where everything required for prosecuting the campaign is collected and organised before being forwarded to the front, and to which the sick and wounded can be sent back for removal to their homes when opportunities occur. It is usually a port, a stretch of sea-coast, or a river, but may be a mountain-range or tract of country connected by a line of open communication with the army, and supplying it constantly with recruits, remounts, food, ammunition, &c.; so that, if cut from its base of operations, the army is completely paralysed. In the Crimean campaign, the sea-coast from Kamiesch to Balaklava was the base of operations for the allies. In the late Egyptian war, the British base was at first Alexandria and afterwards Ismailia. The German base of operations during the campaign against France in 1870-71 was the right bank of the Rhine, from Cologne to Karlsruhe, with its many fortresses.

Bashahr, one of the Punjab Hill-states, on the lower slopes of the Himalayas, traversed from east to west by the Sutlej. Area, 3320 sq. m. The rajah and upper classes in the southern parts are Rajputs, and the people generally are of Hindu race, but their observance of Hinduism is very partial. The rajah pays tribute to the British government, for which he is required to raise troops in time of war, and by which his sentences of death must be confirmed. Pop. (1881) 64,345.

Ba'shan, a country of North-eastern Palestine, situated to the east of the Jordan. This region is a volcanic plateau rising in the Jebel-ed-Drûz to 6000 feet; extends 60 miles north and south, and about 40 miles east and west. Josephus mentions four provinces: Gaulonitis, a western division, the territory of Golan, the ancient Hebrew city of refuge; Trachonitis (ancient Argob) to the east, now known as the remarkable volcanic region of the Lejâh; Auranitis, comprising the fertile Hamûn plain; and Batanea to the south, the seat of the Oruses (q.v.). In the time of Abraham, Bashan was occupied by the Rephaim ('giants'). Ashteroth-Karnaim, identified with Busrâh; Edrei, identified with Derât; and Kenath, with Kunawât, were its chief cities; the first two being the residence of its kings during the Amorite dynasty. The last of its Amorite rulers was Og, who with all his sons was killed by the Israelites under Moses, at the battle of Edrei, when the half-tribe of Manasseh settled in the land. The men of Bashan were remarkable for their stature, its soil and pastures for their richness, and its sheep and oxen for their size and fitness. Bashan is covered with the ruins of the so-called 'giant cities,' which, however, according to Captain Conder, date only from the early Christian centuries; their roofs, doors, stairs, and windows are of stone, some of them as perfect as when first built. Bashan belonged to the tetrarchy of Philip, and afterwards to that of Agrippa II. See Dr Porter's *Giant Cities of Bashan* (1865).

Bashaw. See PASHA.

Bashi, or BATANES ISLANDS, the most northerly small cluster of islets in the Philippine chain of islands, lying between Luzon and Formosa. Politically, they are a dependency of the Philippines; but physically, they form a link in the vast archi-

pelago which, from Formosa to Sumatra inclusive, connects the south-east of China with the west of Malacca. They consist of three larger (Batal, Batan, and Saptang) and many smaller islets, and have a united area of 127 sq. m., with a pop. (1879) of 8250, who subsist on the yams and batatas they grow.

Bashi-bazouks' (mod. Turk., 'hot-brained') are irregular troopers in the pay of the sultan. Very few of them are Europeans; they are mostly Asiatics, from some or other of the provinces in Asiatic Turkey. They are wild turbulent men; brave enough if serving under some leader who understands them; they receive no regular pay. They may be either infantry or cavalry, and their usual weapons are a long lance, a sabre, several pistols, and one or more daggers. The famous 'Bulgarian atrocities' of 1876, which roused the indignation of Europe, and ultimately cost the corrupt Turks their supremacy, were mainly due to the lawless brutality of these ruffians.

Bashkirs, a Mongolian people, are a branch of the Ural-Altaic stock, and inhabit the Russian provinces of Perm, Orenburg, Viatka, and Ufa. Sunnite Mohammedans in faith, and partly nomadic in habits, they number about three-quarters of a million in all.

Basic Slag. See SLAG.

Basic Steel. See BESSEMER STEEL.

Basil, surnamed THE GREAT, and called St Basil, one of the most eminent and eloquent of the Greek Fathers, was born about 329 at Cæsarea, in Cappadocia; studied under the heathen philosophers at Athens, where he began a lifelong friendship with Gregory Nazianzen, his later letters to whom are full of information about contemporary times; became an advocate in his native city, but afterwards founded a monastic society; was ordained a presbyter in 364; and succeeded Eusebius as Bishop of Cæsarea in 370, in which office he continued till his death in 379. He resolutely resisted invitations to the court of Julian the Apostate, with whom he had contracted an intimacy as a fellow-student at Athens, and displayed great constancy when the Emperor Valens began to persecute him on account of his opposition to Arianism. He was engaged in most of the controversies of his time, but conducted controversy in a gentle and generous manner. His rules of monastic life are still followed in the Greek and other oriental churches, in which he is highly honoured as one of the greatest of saints. In the Roman Catholic Church, also, they are followed in a few convents, styled of the order of *Basilians*. He is also the author of a revised liturgy, still in use in the East, known as the *Liturgy of the Holy Basil*; but his chief services to the church were in defence of the Nicene creed against the Arians. The best editions of his works are those of the Benedictines (3 vols. Par. 1739), and that of Migne in 4 vols. (29-32) of his *Patrologia Græco-Latina* (Par. 1866); but the authenticity of many of his moral and ascetic pieces is doubtful. His anniversary is celebrated, in the Greek Church, on the 1st of January—the day of his death; in the Latin Church, on the 14th of June—the day of his ordination.

Basil I., the Macedonian Byzantine emperor 867-886, came to Constantinople when still a young man, and was in 861 appointed chamberlain to the Emperor Michael III. After the assassination of this monarch in 867, Basil became sole emperor of the East. His first care was to heal the wounds of the state; and, as the prodigality of Michael had exhausted the public treasury, he took means to refill it by a wise economy. His valour made

him the terror of the Saracens, from whom he reconquered Asia Minor. He sent missionaries to the Russians of Kiev, who, from that time, began to embrace Christianity and acknowledge the authority of the Greek Church. He died in 886. Basil founded a pure despotism, and, as part of a system of centralisation, placed eunuchs at the head of the departments of state, who, as they could not found a dynasty, would be less tempted to rebellion. He also introduced the principle of legitimacy in succession, and initiated the custom of having his descendants born in the 'porphyry chamber,' so that the title Porphyrogenitus might be equivalent to Prince Royal. He left his dynasty so secure that it reigned in greater or less prosperity for 200 years.

Basil (*Oryzanthus*), a mainly tropical or sub-tropical genus of Labiatae (q.v.), characterised by a pleasant aromatic smell and taste, and reckoned among sweet herbs.—**SWEET BASIL** (*O. basilicum*) is an Indian annual which has long been cultivated in Europe for seasoning purposes. It was formerly also of some medicinal repute, and is doubtless a gentle carminative. Many superstitions attach to it. The ancients asserted that the plant had the power of propagating scorpions, even in the brains of men. The belief that it thrives especially on the brains of murdered men occurs in the *Decameron*, and is rendered familiar by Holman Hunt's picture. —**BUSH BASIL** (*O. minimum*) is of similar origin and uses. The seed of both species should be sown on a hotbed, and subsequently planted out. **WILD BASIL** (*Colamintha clinopodium*) and **BASIL THYME** (*C. Acinos*) are natives of Britain, and are similarly fragrant and aromatic.—**Basil Vinegar** is made in the same manner as Mint Vinegar, by steeping the leaves in vinegar. It is used for seasoning, in winter, when the fresh plant cannot be obtained.

Basilica (Gr. *Basilikē*, from *Basileus*, 'a king'), a market-place, exchange, and place of meeting for men of business generally. The first basilica we hear of at Rome is the Basilica Porcia in 182 B.C. From this period till the time of Constantine, they were constructed in great numbers. Some twenty are known to have existed in Rome, and latterly every provincial town, even those of small extent, had each its basilica, as that of

court of justice. It has generally been supposed that the praetor's apse and seat were at one end of the central division, immediately opposite the entrance at the other, but this is now disputed (see *APSE*). The form of the basilica was not always

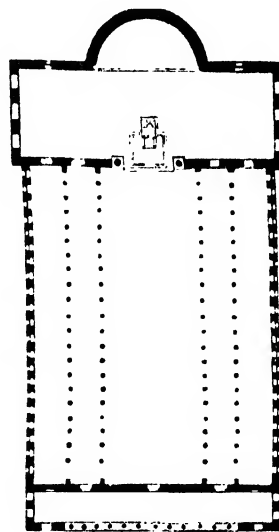


Fig. 2.—Ground-plan of Basilica of St Paul, Rome.

the same. Sometimes there was no hemicycle or apse, as in the basilica at Pompeii, in which case the tribunal was cut off from the nave; sometimes there were two, as in the basilica of Trajan. Again, the basilica was sometimes entered, not from the end, but from the sides, where the transepts of a modern church are situated; and at the end opposite that in which the tribunal was placed there was often a row of small chambers, the uses of which do not seem to be very accurately ascertained, and probably were not invariable. In the basilica of Pompeii there was an outside stair which led to the upper gallery, which in this case passed entirely round the building. The gallery was the place to which loiterers usually resorted for the purpose of watching the business proceedings below; and the one half of it is said to have been devoted to men, the other to women. The large churches of the Christians, erected after the religion was adopted in the empire, had a considerable general resemblance to the Roman basilica, and those churches have always gone by the name of basilicas. But Professor Baldwin Brown disputes this, and maintains that the early church was rather an enlarged schola (or guild-hall) than a basilica. Probably the professor's view is right as regards the churches of the first three centuries, but when thereafter the congregations largely increased, the churches were enlarged after the idea of the basilica.

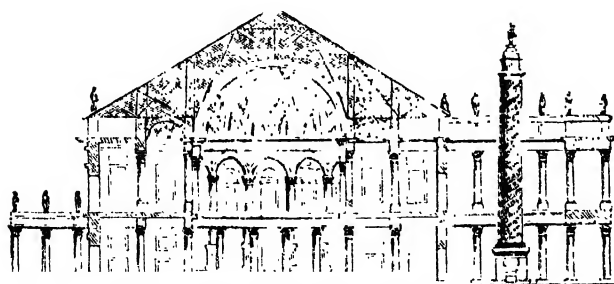


Fig. 1.—Section of Trajan's Basilica, Rome.

Pompeii, which is now the most perfect example, still testifies. The earliest basilicas were entirely open to the external air, and were surrounded with a portico under which shelter could be obtained; but in course of time the central space was also covered in. The basilica then became an oblong hall, divided with rows of columns into a wide central nave and lower side aisles, over which there was frequently a gallery. The central space was lighted with windows in the upper part of its side walls (like the clerestory of a church). Amongst its other uses, the basilica contained an apse, in which the praetor conducted his

basilica. Probably the professor's view is right as regards the churches of the first three centuries, but when thereafter the congregations largely increased, the churches were enlarged after the idea of the basilica.

Fig. 2 shows the usual plan of these Christian basilicas—a large oblong space, divided into central nave and side aisles by two or four rows of columns, preceded at the entrance end by a porch or narthex (to which alone the neophytes and penitents were admitted), and terminated at the opposite end with a cross wall, containing in the centre a great triumphal arch which led into the

transept or sanctuary reserved for the clergy, out of which opened the apse, with the bishop's throne in the centre, raised some steps above the floor, and the seats of the presbyters and deacons on each side. Between the bishop and the people stood the altar, generally raised over the crypt which contained the body of the saint to whom the building was dedicated. The narthex was usually preceded by an open court with colonnade and fountain. Attached to this was the Baptistry (q.v.).

A large number of basilicas still exist in Rome, dating from the 5th and 6th centuries up to the 10th. Churches in France and England were sometimes honoured by the pope's permission to assume the title of basilica.

Basilica, a code of laws of the Byzantine empire, the compilation of which was begun in the reign of the Emperor Basil I., the Macedonian, completed by his son Leo, the Philosopher, and first published in 60 books in 887. Constantine Porphyrogenitus, the son of Leo, prepared an official commentary to it, as well as a revised edition of the work itself. It was very much an adaptation of the code of Justinian to altered circumstances, and is of great value for the interpretation of the *Corpus Juris*. Apparently the code was at first called *The Revision of the Ancient Laws*, next *Herikontabiblos*, from its division into sixty books; and finally, before the end of the tenth century, it came to be called by its present name—apparently an elliptical form of *basilika nomina* ('imperial constitutions'). Some have supposed, however, that the name was derived from that of the Emperor Basil, as those legal forms instituted by his son were originally initiated by him. There are editions by Fabrot (7 vols. fol. Paris, 1647) and Heimbach (6 vols. Leip. 1833-70).

Basilicata, one of the sixteen 'compartimenti' of the kingdom of Italy, touching the Gulf of Taranto. It exactly corresponds with the official 'province' of Potenza (q.v.), the province being the administrative unit, the compartimento usually a conventional grouping of several of the 69 provinces.

Basilicon (Gr., 'royal,' or 'of great virtue'), a name given to four kinds of ointment, all of which contain the substances yellow wax, resin, and olive oil, along with other ingredients. Basilicon proper differs from *Yellow Basilicon* in containing suet and turpentine in addition to the above ingredients, while Burgundy pitch is also used in the preparation of the yellow ointment. *Black Basilicon*, or *Unguentum Tetrapharmacum* (*tetra pharmaka*, four drugs), derives its name from containing one-fifth of black pitch along with the three drugs above mentioned. *Green Basilicon* contained verdigris, but has quite fallen into disuse. The resin, wax, and other ingredients of basilicon are melted together over a slow fire; the oil is then added, and the mixture, while hot, strained through linen. The straining is directed in consequence of the impurities which resin often contains. Basilicon ointment, or resin cerate, as it is usually called, is much used as a gentle stimulant application to blistered surfaces, indolent ulcers, burns, scalds and chilblains.

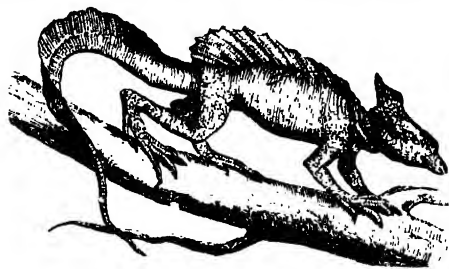
Basilicon Doron (Gr., 'the royal gift') is the name of a work written in 1499 by James I. of England (then James VI. of Scotland) for his eldest son, Prince Henry. It expounds James's views as to the divine right of kings.

Basilides, one of the greatest of the Gnostics, who flourished at Alexandria about the year 125 A.D. Many of his fantastic speculations bear greater resemblance to the doctrines of Zoroaster, and in some points to Indian philosophy, than to the religion of Jesus. The first principle of all

things is the unborn and unknown Father, from whom emanated in succession *nous* ('mind'), *logos* ('the word'), *phronēsis* ('understanding'), *sophia* ('wisdom'), and *dynamis* ('power'). From the last sprang *dikaioσnē* ('justice') and *eirēnē* ('peace'), and these seven with the Father formed the first Ogdoad, or octave of existence which originated the first heaven. From them emanated other powers which created the second heaven, and so on through the whole circle of emanations, which amount to 365, the mystic number so often inscribed on the symbolic stones in the Gnostic schools (see ABRAXAS STONES). Each of these angelic powers governs a world. There are, consequently, 365 worlds, to each of which Basilides gave a name. The *archōn* or head of the 365th, or lowest world, rules the material universe, which he also created. He is the God or Jehovah of the Old Testament, and when the earth was divided among the rulers of the material universe, the Jewish nation fell to the share of himself, who was the prince of the lowest class of angels. But wishing to absorb all power himself, he strove against the other angels, and to make them subject to his 'chosen people,' the result of which was war, strife, division in the world, together with the loss of the true religion, to restore which the Supreme God sent *Nous*, the first emanation who became incarnate in Jesus at his baptism. His disciples (Basilidians) were numerous in Egypt, Syria, Italy, and even in Gaul, where they continued to exist till the 4th century. Such mainly is the account of the teaching of Basilides given by Irenæus, and accepted by all until the discovery of the *Philosophumena* of Hippolytus in 1842. According to this, Basilides started with a God unknown and unknowable by human faculties, rather than with a dualism of God and matter or evil, or with a theory of emanation. This non-existent God by his volition created the *patasperma*, or seed, the germ of all things, containing within itself three degrees of divine sonship: one pure, the second gross, the third requiring purification. The great *archōn*, sometimes called Abraxas, next spring from the *patasperma*, ascended into the firmament, and produced a son greater than himself, by whose help he framed the world. Their rule—the Ogdoad—extends through all the ethereal region down to the moon's sphere, where the grosser air begins—the Hebdomad, ruled by an inferior *archōn*, the God of the Jews. The process of enlightenment is thus: first, the mind of the son of the great *archōn* is illuminated; next, the light passes to the son of the *archōn* of the Hebdomad, then to Jesus, who instructs such of mankind as are capable of truth. Their souls go upwards; their bodies return to the primeval chaos. The three progressive periods of human enlightenment are thus the Ante-Jewish, the Jewish, and the Christian. See Baur's *History of the Church in the first three centuries*.

Basilisk (*Basiliscus*), a genus of Central American lizards, in the family Iguanidae, differing, however, from the Iguanas in the absence of a dilatable throat-pouch and of thigh-pores, and in the presence of a continuous movable fin-like crest, with supporting spines, extending from the back along the tail. The back of the head also bears a hood-like sac, projecting upwards and backwards. The body is covered with small scales disposed in zigzag fashion, and there are teeth on the palatal bones. The colour shades off from yellowish-brown to white; the total length of the common form (*B. mitratus*) is about two feet; the diet is largely vegetarian. They are harmless, lively animals, climbing and swimming actively, and only in their quaint form suggesting any resemblance to the mythical basilisk of the ancients, which united all

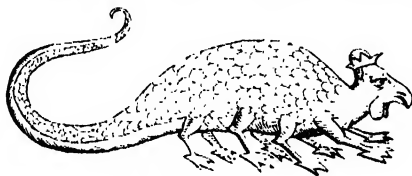
the fearsome characteristics that wild imagination could invent (see below). The common hooded basilisk inhabits Guiana, Martinique, and



Basilisk (*Basiliscus mitratus*).

tropical South America generally, and extends northwards into Mexico. Another larger species (*B. amooensis*) inhabits the islands of the Archipelago, and its tender flesh is much used for eating. See IGUANA, LIZARD.

The fabulous BASILISK (Gr. *basilikos*, diminutive of *basileus*, 'a king,' so named, according to



The Mythical Basilisk.

Pliny, from the spot on the head like a crown) was by ancient and medieval authors believed to be hatched by a serpent from an egg laid by a cock. It inhabited the deserts of Africa, and, indeed, could inhabit only a desert, for its breath burned up all vegetation; the flesh fell from the bones of any animal with which it came in contact, and its very look was fatal to life; but brave men could venture into cautious contest with it by the use of a mirror, which reflected back its deadly glance upon itself. Trevisa calls it the 'king of serpents that with mile and sight slayeth beasts.' It is described as about a foot long, with a black and yellow skin, and fiery red eyes; and its blood was supposed to be of great value to magicians. The weasel alone could contend with it, curing and reinvigorating itself during the combat by eating rue. The crowing of the cock was also obnoxious to the basilisk.

The word *basilisk* and its equivalent *regulus* are sometimes used in the Vulgate. The authorised English version of the Old Testament sometimes reads *adder*, and sometimes *cockatrice* (as in Isaiah xi. 8). The revised version reads *basilisk*.

The name was anciently applied to a large cannon, usually of brass, throwing a shot of about 200 lb. weight.

Basim, or BASSIM, a town of India, in the province of Berar, 413 miles E. by N. of Bombay. Pop. (1881) 11,576.—The fertile district of Basim has an area of 2958 sq. m., and 358,883 inhabitants.

Basin, in Geology, is a term applied to depressions in the strata, in which beds of a later age have been deposited. Thus, the London basin, consisting of tertiary sands and clays, occupies a hollow in the chalk, which is bounded by the North Downs on the south, and by the chalk-hills of Berks, Wilts, Bucks, and Herts. to the north. The term has also been applied to synclinal depressions of strata, as the coal basin of South Wales. Such

synclinal basins do not necessarily give rise to any corresponding depression at the surface of the ground. See ANTICLINE.

Basin of a river, in Geography, is the whole tract of country drained by that river. The line or boundary which separates one river-basin from another is called the watershed. By tracing these watersheds, the whole of a country or continent may be divided into a number of distinct basins; the basin of a lake or sea being made up of the basins of all the rivers that flow into it.

Basingstoke, a town in the north of Hampshire, 48 miles WSW. of London. It is a place of much activity, being situated at the junction of five main roads to London from the south and west of England, and it is also an important railway centre. Its chief buildings are the fine Perpendicular parish church, the town-hall (1832), and the corn exchange (1865); and it has a trade in corn, malt, coal, and timber. Basing House, 1½ miles eastward, belonging to the Marquis of Winchester, for two years withstood the forces of the Commonwealth; but Cromwell at last took it by storm, and burned it to the ground, in 1645. The remains consist of the gate-house and a few walls and mounds. Pop. (1871) 5574; (1881) 6681.

Baskerville, JOHN, a celebrated English printer and letter-founder, was born in 1706 at Sion Hill, Wolverley, Worcestershire. A footman to start with, he afterwards became a writing-master in Birmingham, and from 1740 carried on the business of japanning there with great success. About 1750 he began to make laborious and costly experiments in letter-founding, and succeeded in making types which have scarcely yet been excelled. The quarto *Vergil* printed by him at Birmingham (1756), in Macaulay's words 'was the first of those magnificent editions which went forth to astonish all the librarians of Europe,' and which, 55 in number, included Milton, Juvenal, Congreve, Addison, the Bible, a Greek New Testament, Horace and Catullus. He died, bequeathing £12,000, 8th January 1775. A foe to all that he termed 'superstition,' he chose to be buried in his own garden, whence, the ground being wanted for building purposes, his remains were exhumed in 1826.

Basket, a vessel of wickerwork, made of willows, reeds, cane, straw, bast, or other materials, interwoven. The origin of the word is very obscure. It has been conjecturally allied with Lat. *bassula*, used by Juvenal and Martial, and by the latter given as British; but at present there is no evidence to connect the words. It is found in English since the 13th century, but it does not occur in the Teutonic or Romance tongues. In ancient Britain the shields of soldiers were formerly made of basket-work as well as their coracles or boats; the latter were made water-tight by being covered with the skins of animals. Similar boats are still used for crossing some of the rivers of India. Window-screens, chairs, pony-carriages, and screens are made of basket-work. Willows are largely grown in Holland, France, and Germany, though those most in request among basket-makers are grown in England in the valleys of the Thames and Trent. In several parts of England and Scotland, great attention is now paid to the cultivation of the willow; and judging from the statements of some of the cultivators, the returns yielded are very satisfactory (see OSIER, WILLOW). The tools required being few and inexpensive, a large number of poor persons are engaged in the manufacture of baskets, that are hawked about the streets by their wives and children. But a large proportion of these are of French manufacture, as is also the case with the

fancy baskets sold by blind asylums. Baskets are of all shapes and sizes, and their uses are so well known to all as to obviate the necessity of description here.

Basle. See BASEL.

Basnage, JAKUES, the son of an able advocate in the parliament of Normandy, was born in 1653 at Rouen, where he became pastor of the Reformed church. On the revocation of the Edict of Nantes (1685) he retired to Holland, and finally settled as minister of the Walloon church in the Hague, having gained the friendship of the Grand Pensionary Heinsius. Here, while zealously discharging his religious duties, he was called upon to take an active part in state affairs, particularly in negotiating the defensive alliance concluded between France, England, and the States-general in 1717. Amid all these duties and distractions, Basnage cultivated literature with ardour, and was no less distinguished for his extensive learning than for the polish of his manners and the integrity of his character. His chief works are of an historical nature. One of the best, a history of the Jews, has been translated into English (Lond. 1708). Basnage died September 22, 1723.

Basques (Spanish *Vascongados*), a curious race on both sides of the Pyrenees, forming, in spite of its small numbers, one of the separate folk-stems of Europe. Whatever may have been its ancient dimensions, their district is now limited to the Spanish provinces of Biscaya, Guipuzcoa, and Alava—the three so-called Basque Provinces—with part of Navarre; besides the French arrondissements of Mauléon and part of Bayonne, forming about a third of the department of Basses Pyrénées. The French part formed in ancient times the three territorial divisions, *La Labourd*, *La Basse-Navarre*, and *La Soule*, embracing the valleys of the Bidassoa and Nivelle, of the Nive and Bidouze, and of the Saison, an affluent of the Gave d'Oloron. The Basque region in Spain forms, according to Elisée Reclus, about the thirtieth part of the surface of the peninsula. The boundary with France is a purely artificial one. The orographic system is very complicated; it may be compared to an inextricable knot binding the great chain of the Pyrenees to the plateau of the Castiles. Indeed the whole country is a medley of valleys, gorges, cols, passes, heights, and plateaus. Its general aspect is smiling and gay, save in the southern part of Navarre in the basin of the Ebro. In the French provinces one sees indeed abrupt and bare hill-slopes, but side by side with these the plains are cultivated, the mountains covered with firs, beeches, oaks, and chestnuts, with here and there fields of wheat or maize. A large portion of the surface is still uncultivated; often the soil is clothed only with an abundant natural vegetation consisting of ferns, gorse, and heath, made use of to provide litter for the cattle which are kept indoors the greater part of the year. Here and there appears a smiling homestead, its door always open, round it almost always a kitchen-garden or an apple-orchard. Agriculture is in a backward state—the only plough in the Spanish provinces is still the *laja*, a clumsy two-pronged fork as old as the Roman epoch. From the point of view of cultivation, the surface may be divided into two distinct parts—the high mountains covered with rich forests, and the plains divided into fields of maize and wheat, vines, kitchen-gardens, with meadows here and there, as well as apple and chestnut orchards. Of all the crops, that of maize is the most important. The Spanish provinces produce wheat, oil, cider, and those natural, heady

and well-coloured Navarre wines, stored in great goat-skin bottles, that have at least a high local reputation. Maize-bread (*mettore*), a poor quality of cider (*pittara*), a highly seasoned soup of vegetables (*elzezurri*), and a dish of green cabbages (*garburu*) are in general use. The foundries excepted, the industries are insignificant, and are mostly worked by strangers rather than the native race. During the last fifty years, but especially between the years 1865 and 1875, there has been a constant stream of emigration, chiefly to South America; and it has been estimated that no fewer than 200,000 Basques are at this moment in the Argentine Republic, in Mexico, and Cuba. Besides, young persons of both sexes, but more particularly girls, are constantly finding their way to the large towns in both France and Spain, of whom many marry and never return. But this is no new thing, for even two hundred years ago Basques were in high repute as servants, and we invariably find in the old French comedies a Basque lackey.

The question is often asked, are the Basques ethnologically of a uniform type? It was long believed that they were all brachycephalic, but the researches of Dr Broca, Dr Velasco, Virchow, and Antoine d'Abbadie, both on exhumed skulls and on living subjects, have proved that among the Basques there are two distinct types: a *dolichocephalic*, with a mean cranial capacity larger than that of modern Parisians, and a *brachycephalic*, with a smaller cranial capacity. It is impossible to determine which of these two cranial forms is the characteristic type, and which is anterior to the other. The Basques, then, do not form a pure race, and accordingly we find great variation in height, form, and above all in the colour of the eyes and hair. The Basque, like most peasants of Southern France, is strongly imbued with prejudices, with ancient superstitions, which Catholicism has not been able to eradicate; he is devoted to his peculiar customs, soft and complacent in his manners, but irascible and formidable in his anger; ardent and enthusiastic, but habitually serious; proud and independent, and gifted with a high sense of his personal dignity. His morals are pure and simple; his religious convictions ardent and sincere—there are few families that do not count a priest among their members. His stubborn independence is shown by the tenacity of his assertion of his ancient rights, the *Fueros* ('privileges') (q.v.); and the noble loyalty of his nature by his reckless allegiance to lost causes, notably to that of the Carlists, grandfather and grandson, in 1833-37 and 1872-76, which cost the Basques the last of their ancient and distinctive privileges. The decree of 9th July 1876 destroyed the last remnant of ancient Basque nationality, by introducing the conscription and the same taxation as in the rest of Spain. Two hundred years ago most of the Basques were sailors; they fished the whale and the Newfoundland cod, and we are even told that there was the commercial language of Canada. They have produced a large number of great seamen. If we need not believe that they discovered America before Columbus, it is at least true that Sébastien d'Elcano, the lieutenant of Magellan, who actually circumnavigated the globe, was a countryman. To-day nine-tenths of the natives are devoted exclusively to agriculture. The few who devote themselves to liberal studies make indifferent mathematicians, but show much taste for purely literary studies, especially poetry and works of imagination. This race has produced some creditable men of letters, as the Spanish poet Alonzo d'Ercilla; but a prouder boast is its claim to the paternity of one of the most remarkable institutions of modern times—Ignatius Loyola, the

founder of the order of Jesus, and Francis Xavier, the most devoted of its missionaries, were Basques.

The Basque still preserves part of his ancient and characteristic costume in the *béret* (*boina*), a blue or red cap, like the Scotch broad bonnet; the belt (*zinta*)—almost always red in France and blue in Navarra—and the short jacket thrown over his shoulder. His shoes are the hempen *espartinas* (Fr. *espadrilles*, Span. *alpargatas*). He wears no cravat, and is usually closely shaved; indeed the first care of the young Basque soldier on his discharge is to cut off the compulsory moustaches of the service. The old men usually wear the hair long. Young and old are armed with the *makhila*, a staff of medlar, loaded at its lower end, which can be hung to the wrist by a leather knot, and which, in the hands of an active fellow, is a formidable weapon. They are passionately fond of games, especially dancing and hand-ball (*pelote*); and there is no village without its *rebot*, where, of only young but middle-aged men play in organised matches in presence of the whole village with marvellous vigour and agility. The only one of their distinctive dances that still survives is the grave *matxiko*, the so-called 'Basque dance,' reserved for men alone. They sing much, their original songs being mostly in a minor key, the tone sad and sweet, the words expressing usually the sorrows of love. But the most remarkable of their distinctive institutions are the *Pastorales*, or Basque dramas, which now survive, however, only in La Soule, in the two French cantons of Tardets and Mauléon, where they are played every year, on the occasion of some great festival, spite of the opposition of the curés. Each *pastorale* is preceded by a long prologue, and terminated by a morality appropriate to the subject. The emphasis, the gestures, and the rhythm, are traditional as well as the costumes of the actors. The action is always very lively; the movements follow the rhythm of the singing, and in the scenes representing battles the combatants advance and recede regularly, while they repeat the first two and the last two verses of a quatrain, which Mr Webster compares to the strophe and antistrophe of a Greek tragedy. The good march calmly and majestically; the bad, with great steps and with horrible gestures; while the devils dance, leap, and run about continually. Usually the spectacle, which is preceded by a promenade of the whole troupe through the village, does not last less than seven or eight hours, yet the attention of the auditors is unbroken. Their impressions betray themselves by expressive interruptions; the death of a hero is usually accompanied by universal cries of 'Ai, ai!' and the discharge of pistol-shots. These *pastorales* have never been printed, but are learned by word of mouth during the long evenings of winter. They are all in Basque, from 3500 to 6500 lines in length (*Warwick* has 7116 lines), most of them in verses of eight feet, divided equally into strophes of four verses, of which the second rhymes with the fourth, the two others not rhyming. The measure is often very defective, and the rhyme merely a defective assonance. The unities of time and place are unknown, and the division into acts does not exist. The strangest anachronisms occur, and events succeed each other without the least transition. In one, that of *Claudien and Mar-simissa*, Mr Webster found a Roman emperor, a king of France, a Duc de Richelieu, a Pope Julius, a King Nero, Cardinal Baronius, and the grand Turk Mustafa. Charlemagne is represented with blue spectacles, a blue dress, white cotton gloves, a *makhila*, two old chains, and the cross of the Legion of Honour or a Crimean medal. All of them tend ingeniously to the

honour of the Christian religion, and to the disgrace of Saracens and Mohammedanism. In all these figure pagan Turks whom the devils aid, and whom the Christians always conquer or convert in the end. The date of these strange compositions thus points back apparently to the Spanish 'war of reconquest,' from the 13th to the 15th century. Many of them are mere survivals of the old medieval mysteries and moralities, even down to the very buffooneries, more or less gross, which distract the attention of the auditor. Mr Webster has since communicated to the writer his discovery that the pastorales are all composed directly from the French chap-books hawked about the country, the originals having actually been shown him by their authors. Of course indirectly through these they go back to the old *chansons de geste*. A good account of these chap-books is given in vol. ii. of Ch. Nisard's *Histoire des Livres populaires* (Paris, 1854).

Language and Literature.—The wonderful language of the Basques (by themselves called *Eskuara*, *Euskara*, *Uskara*, a word of uncertain origin, from which are formed the French adjective *Euscarien*, and the national name of the Basques, *Eskualdunak* or *Euskaldunak*, 'those who have the Euskara') stands as yet absolutely isolated from all the tongues of Europe, and furnishes perhaps the only example of a consistently incorporating language. It belongs to the agglutinative division of languages joining on the varying to the permanent element of the word, and post-fixing for the most part the sounds which express the relations of grammar. It shows in some of its compounds a strange but merely casual analogy with the polysynthetic languages of America, and must be placed morphologically between the Finnic family, which is simply incorporating, and the North American incorporating and polysynthetic languages. Of course this statement is quite a different thing from a conclusion that Basque has any identity other than a singular analogy either with the Finnic or Magyar on the one side, or the Algonquin or Irokese on the other. It constitutes an independent stem of the agglutinative class, while the Uralic languages belong to another independent stem of the same class. Basque has no graphic system of its own, but employs the Roman character. Its general alphabet is very complicated; Prince Louis-Lucien Bonaparte counts 13 simple vowels and 38 consonants, and to these 51 phonetic elements we must add 6 diphthong-vowels and the aspirated consonants. The doubling of consonants is not permitted, and in actual speech many soft consonants are dropped. The letter *r* cannot begin a word. The cases are formed by post-positions, which may be added one to the other, and in the modern dialects the singular is distinguished from the plural only in the definite declension, where the post-fixed article is *a* in the singular and *ak* in the plural; as *gizona*, 'the man,' *gizonak*, 'the men,' *emakumea*, 'the woman,' *emakumeak*, 'the women.' The inflectional order of our language is thus inversed; instead of the grammatical modifications expressed by cases or by prepositions, Basque employs post-positions—suffixes always agglutinated to the noun: *zaldi*, 'horse;' *zaldia*, 'the horse;' *zaldia-aren*, 'of the horse;' *zaldiko*, 'of horse;' *zaldibet*, 'one horse,' &c. Some of the common suffixes are *k*, the mark of the plural and of the agent; *n*, 'in;' *i*, 'to;' *z*, 'by;' *ik*, 'some;' *ko*, *go*, *dik*, *tik*, 'of;' *kotzat*, *tzat*, *tzako*, *kiko*, 'for;' *kin*, *kaz*, *guz*, 'with;' *gatik*, 'for;' *gan*, *baithan*, 'in;' *gandik*, 'from;' *ra*, *rako*, *ronz*, 'towards;' *gana*, 'to,' *at*, &c. Of these suffixes some are joined to the definite, others to the

indefinite noun, or also to both. The personal pronouns are *ni*, 'I'; *gu*, 'we'; *hi*, 'thou'; *zu*, 'you.' There are still four demonstrative pronouns: *a*, *hura*, *hau*, *hori*, but traces of others now lost are seen in the flexions of the verb; *d*, as a third person, subject and object; *t*, as a first person, subject; as *dakust*, 'it see I,' from *d-ikust-t*; *doa*, 'he goes,' from *d-oa*. The pronoun 'self' is rendered by *buru*, 'head.' The relative pronoun is rendered by the suffix *n* agglutinated to the verbal flexion; its oblique cases by the interrogative pronoun *zein*. The other interrogatives are *nor*, 'who,' and *zer*, 'what;' as *nor du hor?* 'who is there?' *zein du haur?* 'what is this?' *Bat*, 'some one;' *batzu*, 'some' (plural); *bakoch*, 'each;' *batbedera*, 'every one;' *bana*, 'one by one;' *harritz*, 'many;' *norbait*, 'some-one;' *ekar*, 'each other,' are indefinite pronouns. The Basque has no genders, but it uses verbal forms of address, in which the sex of the person addressed is indicated by a special suffix, thus: 'I do not know him,' spoken to a woman, is *eztakint*: to a man, *eztakint* (for *eztakikat*). The grammar would be simple but for the verb, which in the conjugation is exceedingly complicated. It incorporates the pronouns, having a different form for 'I have it,' 'I have it to you,' &c., as well as for addressing a woman, a man, a superior, and an equal. Thus, *dat*, 'I have,' generally speaking; *diat*, 'I have,' to a man; *dinat*, 'I have,' to a woman.

In its present state Basque does not employ its regular verbal inflections, and has practically but two verbs, 'to be' and 'to have,' all other verbs being generally used as participles expressed in a periphrasis. This system consists in combining a verbal noun with an auxiliary verb, and, instead of saying *dakust*, 'I see it,' to say *ikusten dat*, 'I have it in seeing.' It is true that even at present the non-periphrastic conjugation is sometimes employed, and *eztakint* is still in use, as well as *dakust*, for *ikusten dat*. Spite of the apparent simplicity of the periphrastic conjugation, the number of forms possessed by the verbal noun and auxiliary verb are almost endless, and not only is there a different form for each of the personal pronouns, whether in the objective or the dative case, but there are also different forms for addressing a woman, an equal, a superior, or an inferior. The verbal adjective is the form given in the dictionary, and corresponds to a past participle, as *ikusi*, 'seen;' followed by the suffixes *ko* or *n* it forms a future and a conditional, as *ikusiko dat*, or *ikusiren dat*, 'I shall see it;' the verbal substantive is merely a locative, as *ikusten*, 'in the sight,' 'in seeing.' The various auxiliaries of use in the periphrastic conjugation are *akan*, 'to have;' *eduki*, 'to hold;' *izan*, 'to be;' *edin*, 'can' (though this is doubtful); *ean*, 'may;' *eraman*, 'to move;' *joan*, 'to go;' *ibilli*, 'to move'—the last two already obsolete. Of the two principal auxiliaries, *eduki* is inflected like all other transitive verbs: *dadukut*, 'I hold it,' is formed from *d-eduk-t*, the *a* before *t* being merely a binding vowel, as *kt* could not be pronounced. The present tense forms of 'to have' are: for the singular, *dat*, *duku*, *duu*; and for the plural, *daugu*, *duzu*, *duue*; or, more generally, *dat*, *duk*, *da*, *dugu*, *duzu*, *duue*. The imperfect tense forms are: singular, *neban*, *eban*, *eban*; plural, *genbana*, *zenbana*, *eben*; or, more generally, *nuen*, *huen*, *zuen*, *ginuen*, *zinduen*, *zuten*. The present optative forms are: singular, *duket*, *duket*, *duke*; plural, *dukegu*, *dukezu*, *duketu*; and imperfect singular, *nuke*, *huke*, *luke*; plural, *ginuke*, *zinueke*, *luketu*. Such is the complete verb; its compound tenses are irregularly made up with the auxiliary *izan*, 'to be;' thus, 'I have had,' *izan dat*; 'I had had,' *izan nuen*. The transitive verbs are thus com-

pounded after the periphrastic method—e.g. from the verbal adjective *ikusi*, 'seen;' 'I see it,' *ikusten dat*; 'I saw it,' *ikusten nuen*; 'I have seen it,' *ikusi dat*; 'I shall see it,' *ikusiren dat*; 'I should have seen it,' *ikusi izanen nuen*; 'that I may see it,' *ikusi dezadan*; 'I can see it,' *ikusi dezaket*; 'I could see it,' *ikusi nezake*. The only irregular verb is *izan*, 'to be.' Its present indicative is: singular, *naiz*, *aiz*, *da*; plural, *gara*, *zara*, *dirade*. The primitive conjugation of Basque verbs is now represented only by the auxiliaries of the modern periphrastic conjugation, which, according to Prince Louis-Lucien Bonaparte, has developed in all its dialects, eleven moods and ninety-one tenses (each of which has three persons in each number), variable according to the sex or rank of the person addressed; it receives besides a certain number of terminations, which perform the office of our conjunctions. The syntax of Basque, as of all agglutinative languages, is simple. The phrases are short. Composition is so common that it has caused several juxtaposed words to be contracted and reduced, so as to be partially contracted one with the other. This is the phenomenon known as *polysyntheticism*, seen in the dialects of America, in which the words that make up a sentence are stripped of their grammatical terminations, and then fused into a single word of cumbrous length. Many words are simply formed thus: *odotsa*, 'thunder,' is made up of *odei*, 'cloud,' and *otsa*, 'noise;' and *ilabete*, 'month,' seems to be a compound of *ilargi-bete*, 'full moon;' *ilargi*, 'moon,' itself being composed of *il* or *hil*, 'death,' and *argi*, 'light.' The vocabulary is poor, and we find that there are no pure Basque words for abstract ideas; though this is denied by Prince Louis-Lucien Bonaparte. For example, there are no original words for 'tree,' 'animal,' 'soul;' God is simply 'the master on high;' and if they have a word for 'will,' the same must express 'desire,' 'fancy,' 'thought.'

The study of the language is rendered the more difficult by the extreme variability of its dialects. There are perhaps no two villages where it is spoken entirely alike. Prince Louis-Lucien Bonaparte recognises no less than twenty-five dialects, which, however, fall easily into eight great dialects, which again may be reduced to three. The eight dialects are: (1) The Labourdin, spoken in the south-west part of the arrondissement of Bayonne; (2) the Souletin, in the south-east of the arrondissement of Mauléon; (3) the Eastern Lower-Navarrese, in the north-west of the arrondissement of Mauléon; (4) the Western Lower-Navarrese, in the north-east of the arrondissement of Bayonne; (5) the Northern Upper-Navarrese, in some villages of Guipuzcoa on the French frontier, and in the part of Navarra bordering on the same province; (6) the Southern Upper-Navarrese, in the rest of Basque Navarra; (7) the Guipuzcoan, in the middle and eastern parts of Guipuzcoa; (8) the Biscayan, in Biscaya, Alava, and the western third of Guipuzcoa. The Souletin and the two Lower-Navarrese dialects form the first group, which may be called the *Oriental* division. The Biscayan alone forms the *Western*, and the four others form the *Central* group. These names are drawn from the territorial subdivisions, but the dialects do not correspond exactly. None of these provinces is entirely Basque except Guipuzcoa; Spanish Navarra is hardly half; only a tenth part of Alava along the northern frontier. A little less than a fourth part must be taken from Biscaya, and some Gascon villages from the arrondissements of Mauléon and Bayonne in France. Neither Bayonne, Pampeluna, nor Bilbao are Basque. In some villages of Spanish Navarra Prince Louis-Lucien Bonaparte has observed that

the men speak Spanish together; with the women they speak Basque, as do the women with each other. This ancient language, then, is manifestly disappearing, though very slowly, and besides it is being continually corrupted by the intrusion of foreign words, due to the exigencies of more complex modern life. Its use is strictly prohibited in the Spanish schools—'Euskarism' being a grave fault of which children must not be guilty. It is interesting to notice that in the French provinces it is French and not a patois that is superseding the Basque. By the aid of Prince Louis-Lucien Bonaparte's great *Curtes des Sept Provinces Basques*, published at London in 1863, it is possible to obtain approximately the number of persons who still speak this remarkable Pyrenean language. The total number in Europe is about 610,000; of these, 65,000 are in the arrondissement of Bayonne, and 60,000 in that of Mauléon, while 150,000 are found in Navarre, 180,000 in Guipuzcoa, 10,000 in Alava, and 15,000 in Biscaya.

Unfortunately the history of Basque is very short, and the few early allusions to it are meagre and uncertain. Beyond the eighteen words of Aiméric Picard's manuscript, discovered in 1881, and the few mentioned *en passant* by Lucio Marineo Sienlo in his *Costas illustres y excelentes de España* (Alcala de Henares, 1539), we have scarce anything until the discourse of Panurge in chap. ix. of the second book of *Pantagruel*. This incomprehensible passage is not found in any of the editions of Rabelais' work anterior to that of Dolet (1541), and differs so much from the Basque of to-day as to be almost unintelligible. The oldest printed book in Basque dates only from 1545. This is the famous *Poesies Basques* of Dechepare (reprint, 'Edition Cazals,' Bayonne, 1874), a collection of poems, half devout, half amorous, the work of a curé of Lower Navarre. The next in point of age, but by far the most important of all Basque books, is the New Testament, translated by Liégarague, and printed at La Rochelle in 1571 by order of Jeanne d'Albret (reprint of the Gospel of St Mark, with notes, by M. Vinson, Cazals, Bayonne, 1874; and of that of St Matthew, by M. Van Eys, Maisonneuve, Paris, 1877). The next in importance is Axular's *Gueroco Guero*, in 1643, the most readable perhaps of all Basque books. The first essay at a Basque grammar appeared in 1638, in chap. xvi. of Oñeurt's *Notitia adri signis Vasconie*. But the study of the language really commenced with P. Mamuel de Larraumendi's Grammar, published in 1729, under the proud title, *El imposible vencido: Arte de la Lengua Bascongada*. The first, however, to detect the true mechanism of the verb was the Abbé Darigol, whose *Dissertation critique et apologetique sur la Langue Basque* was published at Bayonne about 1827; but the earliest really scientific attempt to expound its conjugation was made by the Abbé Inchausti in *Le Verbe Basque* (Bayonne, 1858). The best modern grammars are Prince Louis-Lucien Bonaparte's *Le Verbe Basque en tableau* (Lond. 1869); Ribáry's *Essai sur la Langue Basque* (M. Vinson's French translation from the Hungarian; Paris, 1876); W. J. van Eys, *Grammaire comparée des Dialectes Basques* (Paris, 1879); and the same writer's *Outlines of Basque Grammar*, in Trübner's series of 'Simplified Grammars' (Lond. 1883). The last two books contain some theories not generally adopted, and their value has been impugned by the criticisms of several scholars, notably Prince Louis-Lucien Bonaparte. Perhaps the best grammar on the whole is the *Grammatica de los tres Dialectos literarios del Vasconense*, by Don Arturo Campión (Tolosa, Guipuzcoa, 1886). The first attempt at a dictionary was that of P. de Larraumendi, *Diccionario trilingüe del Castellano, Basconense y Latin* (San-Sebastian,

1745). A later book was Salaberry's *Vocabulaire des Mots Basques Bas-navarrais* (Bayonne, 1857). The Basque-French Dictionary of Van Eys (Paris, 1874) and Aizquibel's Basque-Spanish dictionary (Tolosa, 1884) are the most accessible modern dictionaries. Such are the monuments for the study of this strange language, which, whether or no it was spoken in Paradise, according to Erro, at least baffled the devil to acquire. After seven years' diligent study in the Labourd country, he had only two words, *bai*, 'yes,' and *ez*, 'no,' and even these fled from his memory as he crossed the Pont Saint Esprit of Bayonne.

There exists no national Basque literature properly so called. The five or six hundred volumes in the language are translations from the French, the Spanish, or the Latin; and the few original works have been thought and written by persons who have received an education completely French or Castilian. Many of the books are merely translations of such books as the *Imitation*, the *Spiritual Combat* of Scipoli, the *Devout Life* of François de Sales, or collections of devout meditations, hymns, and prayers. Much more interesting than these is the oral literature of the country, though here there is little that is original and spontaneous, even in the songs, children's rounds, riddles, formulas for games, proverbs, and stories. The *pastorales*, already spoken of, come first in interest; but their claim to originality has been rudely shaken by Mr Webster's startling discovery. But this primitive people preserves its legends with a tenacity that is striking in the last quarter of the nineteenth century. Its stories show the strangest intermixture of ancient with totally new ideas. They are still told by the peasants in the long winter nights, at their prolonged wedding or other feasts, or at the gatherings from time to time to strip the husks from the ears of maize. They are still literally believed in, however much they may seem to contradict modern notions of everyday life. They are *leje zaharreko istorriak*, 'histories of the ancient law.' They are arranged by Mr Wentworth Webster in his *Basque Legends* (1877) in the following seven divisions, containing forty-seven stories: (1) Legends of the Tartaro, or Cyclops; (2) of the Heren-Suge, or Seven-headed Serpent; (3) purely Animal Tales, which are neither fables nor allegories; (4) of Basa-Jaun, Basa-Andre, and of the Lamiak, or Fairies; (5) Tales of Witchcraft and Sorcery; (6) Contes des Fées; and (7) Religious Tales and Legends. The collection of M. Julien Vinson, *Le Folk-lore du Pays Basque* (Paris, 1883), which has a somewhat wider extent than Mr Webster's, is divided into *Contes et Recits: Chansons; Formules d'Élimination; Romances, Cantilènes, Dictons; Devinettes; Proverbes et Dictons; and Pastorales*. The stories are thirty-six in number. The Tartaro is a one-eyed Cyclops, closely resembling the monster of Greek mythology. He lives in a cave among his flocks, and is blinded with a red-hot spit by the hero, who escapes by means of the monster's own sheep. It is perfectly possible that the Greek myth may have been borrowed by the colonists in Sicily or the voyagers to Tartessus from some ancient Basque population. The seven-headed serpent recalls the dragon of chaos in Accadian mythology which tempted man to sin, and waged war with Merodach. Basa-Jaun, 'the wild man,' is a kind of satyr or wood sprite; his wife, Basa-Andre, 'the wild woman,' is a kind of sorceress or land mermaid. The Lamiak are true fairies. The legends of witchcraft, as Mr Webster points out, are very poor not because the belief in witches is extinct, but because it is so rife. The stories are told as matters of fact by the narrator in their own words, quite different from the way in which the

legends are narrated in the traditional words, like a text learnt by heart. Witchcraft with them has not yet reached the legendary stage. Indeed it is almost as firmly believed in as it can have been at the beginning of the 17th century, when we know from Pierre de Lancre, the good councillor at the Parlement of Bordeaux, that the Labourd was the chosen home of sorcerers. In his four months' inquiry, May to October 1609, he took the depositions of more than five hundred witnesses, and sent to their doom as many as sixty victims, of whom at least five were priests. (The process is detailed in his *De l'Inconstance des mauvais Anges et Démon*s, 1610 and 1613.) Not only the Basque inclination to sorcery, but their tobacco-smoking, their dancing and their swimming, are severely censured by the rigid councillor. One good reason offered for the levity and inconstancy of the people is that they make so much use of the apple, the fruit of transgression, not only eating its fruit but drinking its juice. Many of the *Contes des Fées* show a close but hitherto unexplained similarity to Celtic legends, as recorded in Campbell's *Tales of the West Highlands*; while others are obviously derived directly from the French. The Religious Tales are specimens of a literature which in mediæval times rivalled in popularity and interest all other kinds of literature put together. 'Their grossness and rudeness,' says Mr Webster, 'to a great extent hide from us their real tenderness and true religious feeling; but they were, doubtless, to those who first heard them, and are still to those who now recite them, fully as instructive, and have quite as beneficial, purifying, and ennobling influence on them as the most polished and refined of the religious tales of the present day have on the young of our own generation.' Beside the invaluable collections of Mr Webster and M. Julien Vinson already referred to, as many as 110 stories have been printed by M. Cerquand in his *Légendes et Récits Populaires du Pays Basque* (four parts, Pau, 1871-82).

History.—The early history of the Basque race is as yet entirely uncertain, but so far it appears that at no time in history was there any Basque nationality properly so called, nor can we go back with any kind of historical certainty to a time when they were more than a small tribe of rudimentary civilisation, located more or less widely in the valleys of the Western Pyrenees. The mediæval historians speak of a mountain population, variously named *Cantabres*, *Vascons*, &c., but are unanimous only in the unflattering terms in which they describe them. The pilgrims who crossed the Pyrenees eight or nine centuries ago feared to meet them. In the year 1120 the Bishop of Porto assumed the disguise of a beggar in order to pass safe and sound through the midst of men who were 'murderers, always ready for mischief, cruel and unrestrained,' and who spoke 'an unknown tongue.' It was doubtless they who, three centuries before, had plundered the rear-guard of the Frankish army, and slain the Roland of romance. The French pilgrim, Aimeric Picard, already referred to, speaks of the plundering habits of the mountain people, and of the severe tolls they levied from wayfarers, but testifies that they were good Catholics withal. A formal sentence of excommunication was declared at the third Lateran Council in 1179 against 'the Basques and Navarrese,' who 'practise so many cruelties upon Christians, plundering and ravaging just like pagans . . . without regard to sex or age.' The evidence of the hagiographers is to the same effect: among the many martyrs was St Léon, the first Bishop of Bayonne, killed about the end of the ninth century by 'pirates very cruel and satellites of the

devil.' In the pages of Gregory of Tours, Trédégaire, Isidore, and others we find frequent notices of the plundering ravages of the mountaineers, and from time to time of more or less successful expeditions to punish them by the rulers on both sides of the Pyrenees. The waves of Moslem invasion hardly reached the base of their mountains, but hither fled the remnants of the routed Christian armies, and here began the reaction which was to result in the 'reconquest.' The peoples who then inhabited the northern provinces of Spain, and who had remained independent, had at least the hatred of the eastern conquerors in common, and gradually, under the guidance of enterprising leaders, they grouped themselves together, and formed a number of republics or federal states, from which grew the kingdoms of Asturias in the west; of the Sobrarbe, then of Navarra and Aragon, in the east; and the 'lordship' of Biscaya. Alava, nearer the Moors, constituted a *Behetria*, a word not understood exactly, but at least the government of the province was essentially oligarchic. Guipuzcoa and Labourd do not appear to have been raised to the dignity of distinct states, but merely to have comprised a number of territorial federations designated by the Spanish name of *Hermanidades* ('fraternities'). La Soule and Lower Navarre were dependent upon the kingdom of Navarre and followed its fate; they comprised a number of vassal *vicomtes*, of which that of Soule had the longest history. The Labourd formed a *vicomté* under the dukes of Vasconie, afterwards of Aquitaine. Meantime the struggle with the Moors went on with varying issue—the most glorious day was the 16th of July 1212, when the kings of Navarra, Aragon, and Castile together overthrew the Mussulmans in the plain of Las Navas de Tolosa. Trophies of the victory may be still seen in the churches of Pampluna and Roncevaux, and from that day on the shield of Navarra have figured the famous chains.

The fundamental history of all the Spanish states depends on the part they played in the 'reconquest.' Certain special privileges (Sp. *fueros*, Fr. *foirs*) became attached to particular districts, dating from the time when these were granted in the face of a dangerous enemy, and later were exacted from the king or count at the settlement of the reconquered lands. All the provinces in the north of Spain had *fueros* of this nature, which insured to them not merely exemption from particular imposts or burdens, but something like an actual autonomy, consisting chiefly in a more or less absolute exemption from compulsory military service, the right to free-trade, especially in tobacco and salt, the payment of taxes in a lump, and government through provincial *juntas* and officials born in the country. These *juntas*, which met every year at fixed times in some central building, or, as in Biscaya, under the famous oak of Guernica, consisted of members elected by the countrymen, and with them sat the *corregidor* or representative of the king, and the intermediary between the local and the central authority. In the French provinces a *syndic* corresponded to the *junta*; a royal *bailli*, to the *corregidor*. These provinces did not consider themselves as forming an integral part of France or Spain, but were connected by the personal bond of the sovereign alone, just as the grand-duchy of Luxemburg is to the kingdom of the Netherlands at the present day. Thus the States of Lower Navarre refused in 1649 to send deputies to the States-general of France; and in 1789, when the unity of France and its division into departments had been decreed, the representatives of that little 'kingdom' withdrew from the National Assembly. The Spanish provinces long watched with the most jealous care

any encroachment of the crown upon their fueros. It was only in 1812, at the time of the Napoleonic usurpation, that Navarra for the first time sent representatives to the general *cortes* of the kingdom—to the famous Cortes of Caliz. Biscaya was annexed to Spain by a treaty in 1356; the *hermandades* of Guipuzcoa finally united themselves with Castile in 1200; while Alava, long under a particular fraternity of nobles with an elective over-lord, finally yielded its rights by formal treaty to the king of Castile in 1332. In virtue of these conventions the kings of Navarra, and later, for the three other Basque provinces the kings of Spain, on 'their accession to the throne, swore solemnly to maintain the fueros of the provinces. In Biscaya this ceremony took place under the oak of Guernica. During the insurrection of 1873-76, Don Carlos the younger revived the ancient ceremony. It was thus celebrated for the last time, for the Spanish government in 1876 suppressed the privileges of Alava, Guipuzcoa, and Biscaya, just as it had those of Navarra in 1839, after the first Carlist insurrection.

The origin of the Basques is one of the most vexed questions of ethnology and philology alike. The controversy was first turned into a totally new direction by the publication at Berlin, in 1821, of W. von Humboldt's famous *Prüfung der Untersuchungen über die Uebervölker Hispaniens vermittelt der Waskischen Sprache*. (See especially M. A. Marrast's French translation, 1866, with its valuable introduction, containing a summary of the progress of the Basque question since Humboldt's time.) The great German savant's argument was that the Iberians were a people spread over Sicily, Sardinia, Corsica, the Spanish Peninsula, Southern France, and the British Isles, and that the modern Basques are the remnant of this race elsewhere expelled or absorbed. The main evidence offered was an attempted explanation of a large number of Spanish and other place-names by the known significations and forms of Basque words. This bold hypothesis long found enthusiastic support, but has since been much modified even by its own supporters. It was assailed by Graslin in *De l'Ibérie* (Paris, 1838), and with especial vigour, along Graslin's lines, by M. J. F. Bladé in his learned *Origine des Basques* (Paris, 1869), in which it is maintained that Iberia was never more than a geographical term, that no proper Iberian race ever existed, and that the Basques were always shut in by alien races, their own affinity being as yet absolutely unknown. W. J. van Eys and M. Vinson are almost equally sceptical, maintaining indeed that we cannot at present say more than that the riddle is as yet entirely unsolved. Meantime, however, other scholars have continued to offer their hypotheses, and indeed competent scholars like Prince Louis-Lucien Bonaparte and M. Luchaire have maintained the value of some of W. von Humboldt's results. Anthropological research has proved the existence of a Neolithic race in Europe, of small stature, with long or oval skulls, and this race has been confidently identified with the Basques and Iberians. Mr Boyd Dawkins, in several previous papers, and further in his interesting and valuable *Early Man in Britain* (1880), has found the Iberian characteristics in 'the small dark Highlander,' 'the small swarthy Welshman,' and the 'Black Celts to the west of the Shannon.' Mr Webster, in his paper, 'The Basque and the Kelt,' printed in the *Journal of the Anthropological Institute* (vol. v. 1876), replying to an article by Mr Dawkins in the *Fortnightly Review* for September 1874, disposes of the identity between the dark Kelts and the Basques, by proving that the

Basques are a mixed race, exhibiting a fair as well as a dark variety, and that the former is on the whole the larger *half* of the present population. In the discussion that succeeded the reading of this paper, Mr Webster was followed by no less eminent a circle of specialists than Prince Louis-Lucien Bonaparte, Professor Sayce, and Mr W. J. van Eys. Professor Sayce pointed out that the Basques, physically and linguistically, are the representatives of a race that preceded the Kelts, and were driven by them into the mountain fastnesses of the extreme west, just as the Finns were by other Aryan tribes in the north. Professor Rhys failed to find many points of similarity between Basque and Keltic, of such a kind as would suggest that the Keltic nations had at any time absorbed Basque ones. Beyond this point the question cannot at present be carried, nor need the inquirer allow his mind to be distracted by assertions unfortified by patient proof. In the meantime, however, it must always be remembered that language and race are not convertible terms, and while the Iberians of ancient Spain probably spoke languages allied to the dialects of the Eskuara, so far there is no proof worth anything that all the tribes called Iberian by classical writers shared the heritage of a common speech. A flood of light may yet be poured on this question, whenever the so-called Celtiberian inscriptions and coins—the *letras desconocidas*—shall be deciphered. But these still await their Champollion. There is as yet no collection containing all these inscriptions, together with the coins: on the latter the chief works are those of Heiss, Bondard, and Sauley in French; and Delgado, Zobel de Zegroniz, and Puyol y Campo in Spanish. There have been many clever theories and attempts at interpretation, but none as yet has gained a recognised authority. But when the day of true interpretation comes, it will mark a great advance in European archeology, and especially in our knowledge of the Basque question.

Many worthless books on the Basque language and history have been printed and reprinted, even under the shelter of famous names. Besides the works on the people, or their literature and history already named, the following should be read: Mahn, *Denkmäler der Waskischen Sprache* (Berlin, 1857); Michel, *Le Pays Basque, sa Population, sa Langue* (Paris, 1857); Prince L.-L. Bonaparte's *La Langue Basque et les Langues Finnoises* (Lond. 1862); J. F. Bladé's *Dissertation sur les Chants heroiques des Basques* (1866); Salaberry's *Chants populaires du Pays Basque* (Bayonne, 1870); Cénac Moncaut, *Histoire des Peuples Pyrénéens* (3d ed. 4 vols. Paris, 1874), to be read with caution; W. J. van Eys, 'La Langue Ibérienne et la Langue Basque' in the *Revue de Linguistique* (vii. 1874); J. Vinson, 'La Question Ibérienne' in *Mémoires du Congrès scientifique de France* (ii. 1874); Paul Broca, 'Sur l'Origine et la Répartition de la Langue Basque' in the *Revue d'Anthropologie* (vol. iv. Paris, 1875), to be read with caution—the linguistic map is of but little value; José Manterola's *Cancionero Vasco* (3 vols. Saint-Sebastian, 1877-80); and Vinson, *Les Basques et le Pays Basque* (Paris, 1882)—an excellent summary, to which as well as to the same scholar's article in the *Dictionnaire des Sciences Anthropologiques*, and to the grammar of Mr W. J. van Eys, the foregoing pages have been especially indebted.

Basra (also *Bassora* or *Bussora*), a town of Asiatic Turkey, is situated on the western bank of the Euphrates, here called the Shat-el-Arab, 56 miles from its mouth in the Persian Gulf. The river, which is navigable up to Basra for ships of 500 tons, is there divided into a number of channels, and by evaporation and frequent over-

flowing, makes the climate very unhealthy. Most of the houses are low huts, built of unburned bricks. The population, once 150,000, had sunk in 1854 to 5000, but the establishment of the English Tigris and Euphrates Steamship Company has altogether changed the prospects of Basra, and the town now probably contains at least 40,000 inhabitants, most of them actively engaged in commerce, notably in the exchange of the productions of Turkey and Persia for Indian and European goods, particularly articles of British manufacture. Basra was founded in 636 by the Calif Omar, and soon became one of the most famous and opulent cities of the East. The possession of it has been the subject of many contests between the Turks and the Persians. It is a place of great note in the history of Arabic literature.

Bas-relief. See RELIEF.

Bass, MICHAEL THOMAS (1799–1884), of the famous Burton brewing firm of Bass & Co., founded by William Bass in 1777, was the son of M. T. Bass; he joined the business on leaving school, and afterwards acted as traveller. The Exhibition year of 1851 gave a great stimulus to the business of Bass & Co.; and now about 3000 persons are employed in the breweries. The average annual amount of business assessed in 1882 was at the rate of £2,400,000, and the yearly issue of labels is over 100,000,000. From 1848 till 1883 Bass represented Derby in the Liberal interest. His benefactions were very numerous, and included the building and endowing of St Paul's, Burton, the total expenditure on the parish being about £100,000; and recreation grounds, a free library, and swimming baths for Derby, at a cost of £37,000. Of simple tastes, he declined more than once a baronetcy and a peerage. Both honours were conferred on his son, M. A. Bass—the former in 1882, and the latter in 1886, when he took the title of Baron Burton.

Bass, or **BASE,** in Music, is the deepest or lowest part, by whatever instrument it may be performed. Next to the upper part the bass is the most striking, the freest in its movements, and richest in effect. In respect to harmony, the bass is the most important part in music, containing more frequently the fundamental notes of the chords, while on it is formed that most important and effective figure in music called 'Organ-point' (q.v.).—Bass is also applied to the lowest and deepest male voice. The compass of a bass voice is generally from F below the bass clef to D above it, which should all be chest-notes, except, perhaps, the highest. Exceptionally deep voices are found in Russia, descending to C below the bass clef, and even further. The bass voice begins to show itself only at the years of manhood, and is generally a change from the alto voice of a boy. It is much more largely used as a solo voice, especially in opera, since Mozart gave it prominence.—Bass or Bass Viol is also the name of an old stringed instrument, with from five to six strings, tuned variously to suit the music, and played with a bow. It was a sort of middle instrument between the contra-bass and violoncello, but is now out of use. Double bass (contra-bass) is the deepest-toned of stringed instruments, and the foundation part of the modern orchestra. There are two varieties, one with three strings, and the other with four; besides a smaller instrument known as the *basso di camera*, used by solo players. See THOROUGH BASS.

Bass, THE. See BASS ROCK.

Bassadore, the principal station for British ships in the Persian Gulf, situated at the west end of the island of Kishm.

Bassa'no, a walled town of Italy, in the province of Vicenza, on the Brenta, 30 miles N. by

W. of Padua by rail. It has a cathedral, and in the tower of Ezzelino is a fine library. Printing is the chief industry; and there is some trade in wine, olives, silk, and leather. In the neighbourhood Napoleon defeated the Austrian field-marshal Wurmser in 1796. Pop. (1881) 6086.

Bassa'no (or, more properly, GIACOMO DA PONTE), an artist of eminence, was born at Bassano in 1510, and studied for some time at Venice. He may be said to have founded a school, whose peculiarity was the delineation of common things, markets, fairs, cattle, and country scenes; but his famous altar-piece of the 'Nativity,' at Bassano, shows his power of handling sublimer subjects. The special merits of his style are its vigorous and picturesque colouring, and its accurate imitation of nature. He died in 1592, leaving four sons, who all followed their father's profession, but were not marked by any special originality of manner.

Bassas, two ledges of rocks to the south-east of Ceylon, distinguished as *Great* and *Little*—the former group being more to the south-west, and the latter, the most dangerous of the two, more to the north-east. They lie in 6° 11'–6° 22' N. lat., and in 81° 28'–81° 43' E. long. On both are lighthouses.

Basse (*Labrax*), a genus of marine fishes of the Perch family. They were known to the Greeks under their generic title, and Aristotle noted the rough teeth on the tongue, the scales on the gill-cover, and the spines on one of the gill-covered bones (*operculum*), which distinguish them from the ordinary perches. The British species (*L. lupus*, or formerly *Perca labrax*) migrates in shoals, from June onwards, to the south coasts of England and Ireland; often ascends rivers, and has been improved by captivity in fresh-water ponds. It is often taken by the small seine-net, or by the trolling rod with sand-eel bait, and it will rise to the fly. The Romans called it *Lupus* (its present specific name) in reference to its voracity, and ancients and moderns unite in the appreciation of its delicacy. The shape is salmon-like, and in Kent it is called the White Salmon or Salmon-dace. There are two dorsal fins, the first spinous, the second flexible. The colour is without the zebra-like bars of the perch, and shades off from dusky blue above to silvery white beneath, where it is as 'bright as a new shilling.' It weighs as much sometimes as 15 lb., but usually much less.

The Striped Basse or Rock-fish of the United States (*L. lineatus*) very nearly resembles the Common Basse, but attains a larger size, and is marked by seven or eight longitudinal black lines. The name Stone Basse is given to various forms, but especially the *Poiggeon cerrium*, a fish very rare on the coasts of Britain, but abundant in more southern parts of the Atlantic Ocean, and found on the American coasts and in the Mediterranean. In general appearance it resembles the common perch more nearly than the basse, but differs from both in having only a single elongated dorsal fin. It is sometimes called the Wreck-fish in reference to the way in which it follows wreckage, or ships on which barnacles are growing, and this it does apparently for the sake of small animals associated with the barnacles. It is easily taken, and is esteemed excellent for the table.

Bassein', (1) a thriving town in Burmah, on the left bank of the Bassein River, one of the mouths of the Irawadi, 75 miles from the sea, but accessible to the largest ships. It is an important centre of the rice trade, has considerable trade with Madras, and in a military view also is important, as it completely commands the navigation

of the stream. It was captured by the British in 1852, since which time the commerce has greatly increased. Pop. (1881) 28,147. The district of Bassein, in the division of Irawadi, has an area of 7047 sq. m. Rice is the chief crop, with cotton, sesamum, and tobacco. Pop. (1881) 389,419.—(2) Bassein, a decayed town in the province of Bombay, 28 miles N. of Bombay, and 5 miles from Bassein railway station. Ceded to the Portuguese in 1534, it was a place of much importance as late as 1720, and its remains still point to a high state of former splendour. In 1765 it was wrested from them by the Mahrattas, and in 1780 surrendered to the British, after a regular twelve days' siege. Pop. (1720) 60,499; (1882) 10,357.

Basse-terre (Fr., 'lowland'), three places in the West Indies.—(1) The capital of St Christopher's or St Kitt's, and the seat of its legislative council, on the west coast, is a low, hot, dusty place, standing at the outlet of a lovely valley of the same name. Its population is about 8500.—(2) Capital of the French island of Guadeloupe, giving its name, moreover, to the larger of the two islets into which Guadeloupe is divided; pop. about 9500.—(3) The chief town of Marie Galante, a dependency of Guadeloupe, which is about 12 miles to the NW.

Basset Horn (Ital. *corno di bassetto*), the richest and softest of all wind-instruments, invented in Passau in 1770, improved by Lotz in Presburg in 1782. It is similar to a clarinet in tone and fingering, but has additional low keys, extending its compass to C in the bass clef, sounding, as the instrument is tuned in F, the F below.

Bassinet. See HELMET.

Bassompierre, FRANÇOIS DE, Marshal of France, was born in 1579 at Hainon, in Lorraine, and came at the age of twenty to the French court, where he gained the favour of Henry IV. Appointed colonel of the Swiss Guards after the king's murder, he was raised to the rank of Marshal of France in 1622; was sent on embassies to Spain, Switzerland, and England; and bore an active part in the siege of La Rochelle. He became, however, an object of suspicion and dislike to Rich. lieu, who caused him to be cast into the Bastille in February 1631, from which he was not liberated until 1643, after the death of Richelieu. He himself died in 1646. Bassompierre was an accomplished courtier, extravagant in luxury, and excessively addicted to gallantries. At the time of his arrest he destroyed 6000 love-letters. The best edition of his *Journal de ma Vie*, written in the Bastille, is by the Marquis de Chantérac (4 vols. Paris, 1870-77).

Bassoon (Ital. *fagotto*), an important wind-instrument of the reed species, made of maple-wood or plane-tree. The bassoon is an Italian invention; its name *fagotto* meaning 'a bundle,' probably from its being made in different pieces laid one against the other. The French call it *Basson de hautbois*; the Germans retain its Italian name. Its invention is attributed to Afranio, a canon of Ferrara, about 1539, but in some form it has existed from the earliest times. In the middle of the

16th century it had already reached great perfection. Sigmund Schnitzer in Nuremberg, who died in 1578, was a celebrated maker. Those by

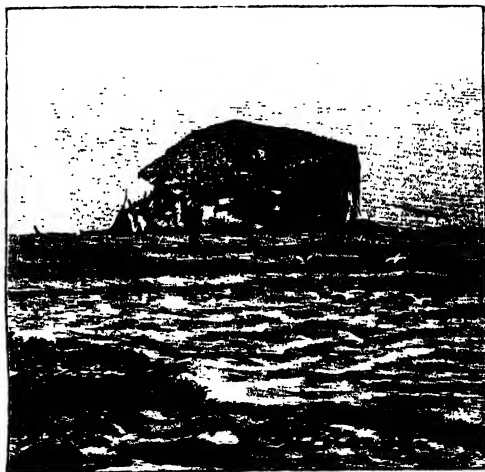
Savary, a French maker, are now highly esteemed. The bassoon consists of a bored-out tube of wood in several pieces, fixed together alongside each other, the bore being conical, and doubled upon itself, so as to bring the holes and keys within the reach of the fingers of each hand. The bassoon has in general not less than 7 holes and 10 keys. In the narrow end of the wooden tube is fixed a small tapering brass tube in the form of an S, on the end of which is placed the reed for producing the tone. The compass of the bassoon is from B flat below the bass stave, to C in the treble. The fingering is complicated and variable in different patterns. The notes for the bassoon are written on the bass clef for the lower part, and on the tenor clef for the higher. The best keys for the bassoon are E flat, B flat, F, C, G, D, and A; all the other keys are difficult. It is scarcely known as a solo instrument, though there is some music for it as such—among others, concerti by Mozart and Weber; but it plays an important part in the modern orchestra, its tone being capable of very varied expression. The double bassoon (*contrafagotto*) is of similar construction, but sounds an octave lower. Bassoon is also the name of an organ-stop, the pipes of which are made to imitate the tones of the instrument.

Bassora. See BASRA.

Bassora Gum. See GUM.

Basso-rilievo. See RELIEF, SCULPTURE.

Bass Rock, a remarkable island-rock of Had-dingtonshire, near the mouth of the Firth of Forth, 2 miles from Canty Bay, and 3½ miles ENE. of North Berwick. Confronted by the ruins of Tantallon Castle, and composed of volcanic greenstone and trap tuff, it is about a mile in circumference, nearly round, and 313 feet high. It is inaccessible on all sides except the south, where it shelves down to the water, and there the landing is difficult, almost impossible when there is any swell. On the west, north, and east, the cliffs rise sheer out of the sea. They are denized by countless numbers of solan geese and other birds, which give the rock a snowy appearance in the distance. A cavern tunnels the rock from west to east, and is accessible at low tide. In 756 St



Bass Rock from the Shore.

Balthere or Baldred died in a hermitage on the Bass Rock; in 1316 it came into the possession of the Lander family. In 1671 Charles II. purchased it for £4000 and within its dreary dungeons many

of the most eminent of the Covenanters were confined during his and James II.'s reign. The Bass was the last spot in the British Islands which held out for the Stuarts. Four young Jacobite prisoners had the address to capture, and, with twelve more who joined them, to hold it for King James, from June 1691 till April 1694, against all the forces which William III. sent against them; at last the spirited little garrison surrendered on honourable terms, and only from a consciousness of failing provisions. In 1701 the fortifications were demolished. Five years afterwards the Bass passed into the possession of Sir Hew Dalrymple, to whose descendant it now belongs. The Bass is let to a 'keeper,' who pays a certain sum for it annually, the rent being made up by the sale of young geese, eggs, feathers, and oil, as well as by fees exacted from visitors to the rock. See an interesting volume on the Bass, by Hugh Miller and four others (1848).

Bass Strait, the channel which separates Tasmania from Australia, contains many islands, chiefly in its southern section, and is greatly beset by coral-reefs. It runs almost due east and west, is about 180 miles long, and has an average breadth of about 140 miles. It was named after Dr George Bass, surgeon of H.M.S. *Reliance*, who settled the question as to the existence of the channel between Australia and Tasmania. After a preliminary voyage, he sailed round the latter in 1798 in a barque of 25 tons, and proved it to be an island.

Bass Tuba. See SAXHOEN.

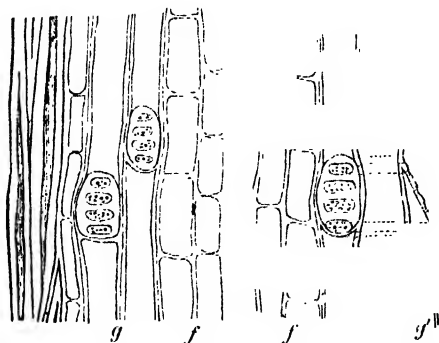
Bast, or **PHLEUM** (formerly often called *Liber*, *Inner Bark*, or *Endophloem*; see BARK), is a term applied by botanists to distinguish that portion of the fibro-vascular bundle which is characterised by the presence of sieve-tubes, from the woody portion which is distinguished by the presence of vessels (see BARK, VEGETABLE HISTOLOGY, DICOTYLEDON, &c.). These sieve-tubes (which are produced by the union of cell-rows, and are in communication by means of protoplasmic threads through oblique sieve-like partitions) are, like the wood-vessels, accompanied by a residue of undifferentiated cells, the *bast parenchyma*. These two elements constitute the *soft bast*, and through this layer the elaborated sap descends from the leaves throughout the plant. This region is recognisable under the microscope by the exceeding

Vessels (q.v.), but these are by no means essential to its structure. Juxtaposed to this soft bast we find the hard bast, which is entirely composed of cells, greatly elongated and thickened into the *bast-fibres*, and to this the important mechanical properties of bast (and consequently, for the most part, the strength, hardness, and toughness of bark) are essentially due. A bast-fibre has frequently a breaking strain greater than that of steel, and the varied economic applications of bast essentially depend upon the fineness and toughness of the fibre; thus the fibres of hemp, flax, jute, &c. are nothing else than bast. The name bast, however, is more usually applied to the inner bark of trees, and is common to the Teutonic languages, designating the inner bark of the Lime-tree (q.v.) or linden-tree, which is employed for making a coarse kind of ropes, mats well known as bast-mats, and a kind of shoes much worn by the Russian peasantry. The trees are cut when full of sap in spring. For bast to be plaited into shoes, young stems of about three years old are preferred; and it is said that two or three are required to make a single pair of shoes. Trees of six or eight years old are cut down for the better kind of mats, which are exported in large quantities from Russia, particularly from the port of Archangel, and which are much used for packing furniture, covering tender plants in gardens, supplying strands with which plants are tied, &c. The trees from which the bast is taken are very generally burned for charcoal. After the bark is dried, its layers are easily separated by steeping in water. The finest layers are the inner, and the coarser are the outer ones. The manufacture of bast mats is nearly confined to Russia and Sweden. Lime tree bast is used in the south of Europe for making hats. The name bast-hat is, however, very often given to a hat made of willow-wood plaited off in thin ribbons, and plaited in the same manner as straw-hats. The inner bark of *Grewia dalymai*, a tree of the same natural order as the lime-tree, is used for making ropes in the Himalaya Mountains.

Bastard, an old French word denoting the 'son of a bast,' or pack-saddle, as opposed to a child of the lawful marriage-bed. Bastards, as described by Blackstone, are such children as are not born either in lawful wedlock, or within a competent time after its determination. The Scots lawyers, and most continental systems of marriage law, define a bastard as a child born of a woman who was not married to the father at the time of conception, and who was never thereafter married to him. This includes the case of an invalid marriage, except according to Scots law in the rare case of a putative marriage—i.e. a mistake in good faith on the part of both parents. Although there is, of course, a presumption of legitimacy where a child is born during marriage, that presumption can be removed by evidence to the contrary.

Bastards are incapable of inheriting real property; nor can they claim any share of personal estate as next of kin to a party dying intestate. It has even been decided that a child born before wedlock in a foreign country, according to whose law such child was legitimate, could not inherit land in England; but this rule does not extend to personal property; nor would such a decision be generally accepted as consistent with private international law. Prior to 1834, even in England, if a bastard held possession till his death of his father's land, his descendants could not be ejected by a legitimate son of the bastard's parents who had subsequently intermarried. Such a bastard was called *bastard cigne*.

There can be no collateral succession through bastards; for as they cannot be heirs themselves, so neither can they have any heirs but those of their



e, bast fibres; *f*, cells of soft bast; *g*, vessel of soft bast, with four perforate sieve-plates seen on the surface of an oblique septum; *g'*, section through septum and sieve-plates.

delicacy and transparency of the walls of sieve-vessels and bast parenchyma alike, and by the presence of protoplasmic contents; while in longitudinal section, the characteristic 'sieves' (which are not, however, always very easy to observe) furnish an additional characteristic (see fig.). In the soft bast also there may frequently occur *Lenticiferous*

own bodies. A bastard is not entitled to the name either of his reputed father or that of his mother, though he may acquire for himself a surname by reputation; nor can he take property under a will by the mere description of *child* of his reputed parent, until he has acquired the reputation of standing in that relation to him. Nor does a bastard follow, as legitimate children do, his father's place of parochial settlement under the poor-laws, but he has and follows the settlement of his mother until he attains the age of 16, or until he acquires a settlement in his own right, and after that age his primary settlement is in the parish where he was born. Another peculiarity of the status of bastardy is, that a bastard being *filius nullius* ('nobody's child'), the consent of his father or mother to his marriage is not required, and is of no avail; but a guardian may be appointed by the Court of Chancery for the purpose, or a license may be granted upon oath made that there is no person authorised to give consent. To this may be added, that although in general a father may by deed or will appoint, in the event of his decease, a guardian for his infant child, he has no such privilege if the child be illegitimate.

In other respects, a bastard is very much in the same position as a legitimate person. Thus, he can hold land in fee-simple, and can dispose of it as he may think proper, and he can make a will bequeathing his whole estate—a privilege which was not conceded to bastards in Scotland dying without lawful issue, till the year 1836. In regard to his personal estate, although the crown is entitled to such in the case of a bastard dying intestate, the royal claim is not strictly enforced; but upon petition, the crown's right will be waived in favour of the bastard's family. In the Scots law also the crown may, by what is called a *gift of bastardy*, grant not only the personal, but also the real estate of an intestate bastard to the 'donatory,' or person similarly entitled, as in the case of personal property in England. Practically the same effect is produced by royal letters of legitimization during the bastard's life. It is also to be observed that the prohibitions as to marriage which extend to collaterals, and to those related by the half-blood only, also apply although one of the parties be a bastard. Again, the laws relative to incest apply to a bastard. A bastard may be made legitimate by an act of parliament for all purposes, even for that of inheriting land, 'as was done,' says Blackstone, 'in the case of John of Gaunt's bastard children by a statute of Richard II.'

In England, the maintenance of an illegitimate child devolves in the first instance on the mother. She is for this purpose entitled to its custody in preference to its father; and she is bound to maintain it as part of her family while she remains unmarried, or until the child attains the age of 16, or gains a settlement in its own right, or (being a female) is married; and in the event of the mother's marriage, the same liability attaches to her husband. If the mother be of sufficient ability to maintain the bastard while he is thus dependent on her, and neglect that duty, so that he becomes chargeable to a parish, she is liable, by 7 and 8 Vict. chap. 101. sect. 6, to be punished under the provisions of the *Vagrant Act*. If the mother is dead or in prison, two justices may appoint a person to take the custody of the child. By the Poor-law Act of 1844, as amended by the Bastardy Acts of 1872 and 1873, the putative father may be summoned and compelled to make a proper allowance, not exceeding five shillings a week, for the support of the child till 16. This is called a Bastardy Order. And under the Summary Jurisdiction Act of 1881, proceedings of this kind may be taken in the local courts, by an English mother in Scotland,

or by a Scottish mother in England, wherever the father is within the local jurisdiction.

The chief points in which the position of a bastard differs in Scotland are, that he is fully legitimated by the subsequent marriage of the parents, and that the mother has the legal custody only until the age of 7 in males and 10 in females. The decree for aliment is given against the father up till these ages, but recently, in consequence of the restrictions placed on employment of children by the Factory, Mines, and Education Acts, the decree has been given up till the age of 10 in the case of boys also. The rate is 2s. 6d. to 3s. per week. At the age of 10, the father would be entitled to take the child from the mother to his house. In Scotland, the father is at common law bound to contribute to the necessary subsistence of the child. Failure to support is punishable under the Poor-law Act.

Both in England and Scotland the widow of a bastard, whether there be issue or not of the marriage, is entitled to dower, terce, *jus relictæ*, and all the other legal rights of widows. See AFFILIATION, DIVORCE, HEIR, ILLEGITIMACY, LEGITIMACY, MARRIAGE, SUCCESSION, ULTIMUS HERES, VAGRANTS.

In the United States also a bastard is one born of an illicit connection, and before the lawful marriage of its parents; one begotten and born out of lawful wedlock. A man is a bastard if born during coverture under such circumstances as to render it impossible that the mother's husband can be his father; or if born beyond a competent time after the coverture has determined. A bastard has no right of inheritance at common law, and the principal right he has is that of maintenance by his parents. In most states, children born before the marriage of their parents are made legitimate by the subsequent marriage of their parents.

The 'Bastard of Orleans' was the famous soldier Dunois (q.v.). Amongst other illustrious bastards may be named William the Conqueror, the Regent Moray, Don John of Austria, the Duke of Monmouth, the Duke of Berwick, and Marshal Saxe. See FIZ, BATON-SINISTER.

Bastard Bar. a popular but inaccurate name for the Baton-sinister (q.v.) in Heraldry.

Bastardy, DECLARATOR OF. This is a suit which may be instituted in the Court of Session in Scotland, for having it declared that the lands or effects which belonged to the deceased bastard, belong to the donatory in virtue of the gift from the crown. The 'defender,' or person against whom the suit is formally brought, is the party who would have succeeded to the bastard, had he been legitimate. The decree in such an action may be necessary for completing the title to lands which belonged to the bastard.

By an act of parliament in 1858, the same conclusion may be substantially obtained by the English proceeding, directed by the act in the Court for Divorce and Matrimonial Causes. The act in question, it is declared, may be cited for all purposes as the 'Legitimacy Declaration Act, 1858.'

Bastia, the former capital of Corsica, is picturesquely situated on the slope of a mountain, rising from the sea in the form of an amphitheatre, in the north-eastern part of the island, 95 miles NNE. of Ajaccio by rail. Its streets are narrow and crooked, its harbour still somewhat difficult of access, yet it has considerable shipping. Antimony-mining, boat-building, iron-founding, tanning, and coral-fishing are carried on; besides, there is some trade in oil, wine, and fruit. Pop. (1881) 19,696. Bastia was founded in 1383 by the Genoese Leonello Lomellino, and was the seat of the Genoese governors for 400 years. It has several

times been in the hands of the English, who, under Admiral Hood, last captured the town in 1794, after an obstinate and protracted siege. When Corsica was divided into two French departments, it was made the capital of one; but when both were united in 1811, the seat of government was transferred to Ajaccio.

Bastian, ADOLF, German traveller and anthropologist, born at Bremen, 26th June 1826, studied at Berlin, Heidelberg, Prague, Jena, and Würzburg, and in 1851 sailed for Australia as a ship's doctor, thereafter travelling in North and South America, Europe, Asia, Africa, and where not else besides. No equally well-equipped ethnologist has ever travelled so widely, and no single observer has accumulated such a mass of invaluable materials for the history of man. It would be difficult to overestimate the indebtedness of the science of anthropology to the practised eye of one restless traveller. His thirty works record his observations in almost as many countries of the world. The most important are in *Der Mensch in der Geschichte* (3 vols. 1860), *Die Völker des östlichen Asien* (6 vols. 1866-71), *Ethnologische Forschungen* (2 vols. 1871-73), *Schöpfung oder Entstehung* (1875), *Die Vorstellungen von der Seele* (1875), *Vorgeschichte der Ethnologie* (1881), *Zur Naturwissenschaftlichen Behandlung der Psychologie* (1883), *Allgemeine Grundzüge der Ethnologie* (1884), *Religionsphilosophische Probleme* (1884), and *Der Fetisch an der Küste Guineas* (1885). Berlin is his headquarters, and in 1869 he undertook the joint-editorship with Virchow and R. Hartmann of the *Zeitschrift für Ethnologie*.

Bastian, HENRY CHARLTON, physiologist, was born at Truro, Cornwall, in 1837, and from a private school at Falmouth proceeded to University College, London, where he became professor of Pathological Anatomy (1867), hospital physician (1871), and professor of Clinical Medicine (1878). His works include *Modes of Origin of Lowest Organisms* (1871), *Beginnings of Life* (1872), *Evolution* (1874), and *The Brain as an Organ of Mind* (1880), the fullest scientific exposition till then published of the views on the subject of psychology held by the extreme physiological school. Dr Bastian is notable as the champion of the doctrine of spontaneous generation.

Bastiat, FRÉDÉRIC, an eminent political economist, was born at Bayonne in 1801. His father was a merchant, and educated his son with a view to the same calling. In 1818 Bastiat entered the commercial house of one of his uncles at Bayonne, and employed his leisure hours in the study of political economy. In 1825 he withdrew from the business, and gave his time to study, especially of economics, extending his knowledge afterwards by travels in Spain and England. Circumstances led him to examine the movement in England for the repeal of the Corn Laws. His first appearance as an author was in 1841, when he published in the *Journal des Economistes* an article on the influence of French and English tariffs on the future of the two peoples. It contained in germ his theory of political economy, and Bastiat from that time was a decided opponent of the system of protection. In 1845 he published a work entitled *Cobden et la Ligue, ou l'Apitition Anglaise pour la Liberté du Commerce*, containing the speeches of the English free-traders. In 1846 he settled in Paris, and devoted his energies to the cause of free-trade. He became secretary of the societies, and chief-editor of the journal established to vindicate its principles; and published his *Sophismes économiques*, in which he attacked the protective system with great wit and controversial acumen. After the revolution of 1848, he was

elected successively a member of the Constituent and Legislative Assemblies. From this time till his death, his strength was applied chiefly to controverting the socialism which became so prominent during the revolution. Suffering from pulmonary disease, he repaired to Italy for change of climate, but died at Rome on the 24th December 1850.

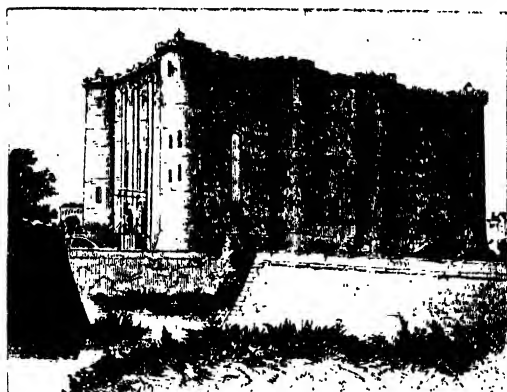
Besides the writings mentioned, Bastiat published *Propriété et Loi, Justice et Fraternité—Protectionisme et Communisme, Harmonies économiques*, and several other important tractates, all of which exhibit extensive knowledge of the subjects discussed, vigorous logic, and a power of sprightly and biting satire (new ed. of his works, 7 vols. Paris, 1881). The *Sophismes* and the *Harmonies économiques* have been translated into English by P. J. Stirling.

Bastide, JULES, a French journalist and politician, Minister of Foreign Affairs in 1848, and member of the Constituent Assembly, was born at Paris in 1800. Bastide was early conspicuous among the radical writers of Paris. Holding a command in the National Guard, he took part in an insurrectionary movement in June 1832, and was condemned to death, but escaped to London. Pardonned in 1834, he returned to Paris, and again devoted himself to politics in the columns of the *National*, and in 1847 he founded the *Revue Nationale*. During the revolution of 1848, he was a supporter of General Cavaignac and an opponent of socialism. In 1858 he published *La République Française et l'Italie en 1848*; and in 1859, *Guerres de Religion en France*. He died March 3, 1879.

Bastien-Lepage, JULES, French painter, born at Damvilliers, November 1, 1848, studied under Cabanel, and early began to attract notice by his impressionist, but strong and real pictures in the Salon. Some of his more important works were 'In Spring,' 'The First Communion,' 'The Shepherds,' 'The Wheat-field,' 'The Beggar,' and 'Joan of Arc listening to the Voices.' Striking portraits were those of his grandfather, his father and mother, Sarah Bernhardt, André Theuriot, and the Prince of Wales. The painter died of a painful and lingering disease at the height of his fame, December 10, 1884.

Bastille was, in France, a general term for a strong fortress, defended by towers or Bastions (q.v.), and in this sense it was used in England also after the Norman Conquest. The famous prison to which the name was latterly appropriated, was built by order of Charles V., between 1370 and 1383, by Hugo Aubriot, Prévôt or Provost of Paris, at the Porte St Antoine, as a defence against the English. From the first, however, it was used as a state-prison, Aubriot himself being confined there on suspicion of heresy. During the 16th and 17th centuries it was greatly extended and provided with strong bulwarks. On each of its longer sides the Bastille had four towers, of five stories each, over which there ran a gallery, which was armed with cannon. It was partly in these towers, and partly in underground dungeons, that the prisons were situated. The unfortunate inmates of these abodes were so effectually removed from the world without as often to be entirely forgotten, and in some cases it was found impossible to discover either who they were or what was the cause of their incarceration. The Bastille was capable of containing 70 to 80 prisoners, a number frequently reached during the reigns of Louis XIV. and Louis XV. These prisoners were seldom criminals; they were victims rather of political despotism, court intrigue, ecclesiastical tyranny, or family quarrels, and were lodged here in

virtue of *Lettres de Cachet* (q. v.) authors, savants, priests, and publishers. At the beginning of the French Revolution on the 14th of July 1789, the fortress was surrounded by an armed mob eager to destroy the stronghold of tyranny. The garrison consisted of 42 pensioners and 32 Swiss. The negotiations which were entered into with the governor led to no other result than the removal of the cannon pointed on the Faubourg St Antoine, which by no means contented the exasperated multitude. Some cut the chains of the first drawbridge, and a contest took place, in which one of the besieged and 150 of the people were killed or severely wounded; but the arrival, with four field-pieces, of a portion of the troops which had already joined the people turned the fortune of the conflict in favour of the besiegers. Delaunay, the governor—who had been hindered by one of his officers from blowing the fortress into the air—permitted the second drawbridge to be lowered, and the people rushed in, killing Delaunay himself and several of his officers. The destruction of the Bastille commenced on the following day, amid the thunder of cannon and the pealing of the *Te Deum*. The event in itself was apparently of no great moment, leading only to the release of three unknown prisoners—one of whom had been there for thirty years—and of four forgers. In that event only the 654 persons whose names now appear on the column in



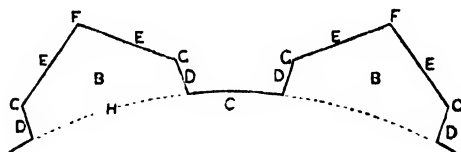
The Bastille.

the Place de la Bastille took part, yet it finally broke the spirit of the court-party, and changed the current of events in France. The Bastille had long been regarded as the stronghold and symbol of tyranny, and its destruction was everywhere hailed as the downfall of an evil system. 'But,' said the king when the news was brought him, 'that is a revolt.' 'Sire,' said De Liancourt, 'it is not a revolt—it is a revolution.' See Carlyle's *French Revolution*, and the Hon. Captain Bingham's *Bastille* (2 vols. 1888).

Bastinado (from Fr. *baston* or *bâton*, 'a cudgel'), the name given by Europeans to the punishment in use over the whole East, which consists in blows with a stick, generally upon the soles of the feet, but sometimes upon the back.

Bastion, part of a system of Fortification invented by the Italian engineers about the middle of the 16th century, and generally used until the introduction of the present polygonal system by the Germans at the beginning of this century. A fortified town is usually surrounded by a deep ditch with masonry sides, behind which is the rampart forming a polygon of many sides. It is important to flank this

ditch so as to prevent the enemy collecting in it, and this is done either, as in modern fortresses, by constructing a projecting work in front of the centre of each face of the polygon, or, as formerly, by making bastions at each of its salient angles. The plan of one *front*—i.e. two bastions and the *curtain* or wall connecting them, is given below, with the names of the different lines forming the *trace*. The distance between the



B, bastion; C, curtain; D, flank; E, face; F, salient;
G, shoulder; H, gorge.

bastions varies from 200 to 600 yards; a greater distance would make the fire from the flank dangerous for the defenders of the face flanked. The main part of a bastion is the rampart, an immense mound of earth, faced with brick or stone, capable of supporting heavy guns, and of receiving the fire of the enemy. A *hollow* bastion has the space behind the rampart kept down to the level of the natural ground; a *solid* bastion is filled up to the level of the rampart. Vauban devised the plan of having large *detached* bastions opposite the chief angles of the place, with a ditch behind each; a tower or small bastion being placed at the real angle of the wall behind. See FORTIFICATION, SIEGE.

Basutos are a South African race belonging to the great Bantu stock, and closely allied to the Bechuanas, if not really a subdivision of the latter people. Their country lies between the Orange River Free State and Natal, and is hilly and well watered. The Bantu stock, as distinguished from negroes on the one hand and Hottentots and Bushmen on the other, is that to which the Kaffirs also belong. The Basutos are superior to the Kaffirs in intelligence and industry, but rank below them in bodily development and warlike energy. They have played an important part in South African history for the last fifty years. They originated politically about the beginning of the century, made up from various races of Bechuanas and Kaffirs, united under Motlame. To him succeeded about 1828 the famous Moshesh, who did much for his people, and maintained from his impregnable rock-fastness, Thaba-Bosigo, a forty years' warfare against both Boers and English. At last, continual fighting so weakened his followers that the English were able in 1868 to add his territory to their possessions. For some years Basutoland formed a part of Cape Colony, but further troubles arose, and the attempt at disarmament in 1878 led to a revolt of almost the whole tribe. Strenuous efforts were made by the colony to put down the rebellion, with but little success. The Basuto chiefs were anxious to be under the direct authority of the imperial government, and the failure of their negotiations disposed the authorities at the Cape to offer no opposition to their demand. A great *Pitso* of the Basutos, held November 29, 1883, attended by the representatives of more than two-thirds of the whole tribe, unanimously expressed a desire for British rule, and a willingness to pay the hut-tax, which was a condition of the imperial government. Accordingly, Basutoland became an appanage of the British crown from March 13, 1884.

Basyle is the name given by Graham, the eminent chemist, to a simple or compound sub-

stance which can unite with oxygen to produce a Base (q.v.). Thus, all the metals are examples of simple basyles, and ammonium, NH_4 , ethyl, C_2H_5 , methyl, CH_3 , &c. represent compound basyles. In recent years the term has fallen into disuse, radicals or compound radicals being used instead to designate the compound basyles.

Bat. Bats form an order of mammals in which the fore-limb is modified for flight. To this fact their technical name (Chiroptera (Gr., 'hand-winged') refers. The order includes a large number of widely distributed forms, and most people are familiar with the swift and curious flight of some of the common species which hunt for food in the twilight.

History.—Aristotle is often labelled by being accused of regarding these mammals as birds; but he was quite incapable of such a crude mistake. His successors were not, however, and many naturalists down to a couple of centuries ago were content to accept the popular appreciation of these animals as 'nocturnal fowls,' or to regard them as altogether hopeless puzzles. In 1683 John Ray referred them, with his usual clearness, to the class Mammalia; and Linnaeus in 1748 gave them an honourable position along with man and monkeys in the highest mammalian order of Primates. Though often regarded as birds by those who are careless of zoological system, such popular names as Flitter-mouse (Ger. *Fledermaus*) indicate some appreciation of their true position. They are now most accurately described as a special order of much modified Insectivora.

General Characters. Since bats are Insectivora modified for aerial locomotion, the most striking general character concerns the structures used in flight. A true wing is present, and consists of a skin-expansion spread out between the four fingers, and extending to the sides and to the hind-legs. An accessory membrane extends from the tail to the hind-legs. The fore-legs are much better developed than the hind pair—a marked exception to the general rule. The strong shoulder-girdle, the capacious chest, the very hollow bones of the limbs, the keel on the breast-bone, the position of the teats on the breast, the simple uterus and generally single birth, and many other general characters, are to be interpreted as adaptation associated with the flying habits of these mammals. The discoidal deciduate placenta, the comparatively low brain with uncovered cerebellum, and other features are shared with the Insectivora, and point to the origin of the bats from that group.

Classification and Distribution.—Two natural sub-orders may be distinguished:—I. Megachiroptera, fruit-eating forms—generally large, with smooth crowns on the longitudinally grooved grinders, usually with a claw on the third joint of the first finger, inhabiting the warm parts of the eastern hemisphere; II. Microchiroptera, mostly insect-eating forms—generally small, with sharp insect-crunching tubercles on the transversely grooved grinders, with a usually single-jointed, never clawed, first finger, inhabiting the tropical and temperate regions of both hemispheres. (1) The frugivorous large bats form the family Pteropodidae, including the African *Epomophorus*, the 'flying fox' *Pteropus*, most abundant in the Malayan and Australian regions, but never occurring in Africa, the *Cynonycteris* of the Egyptian pyramids, the very common Indian bat (*C. noproterus*, and other genera. (2) The smaller insect-eating bats form much the larger sub-order. They comprise five families: (a) the Vespertilionidae, including the common *Pipistrellus* and other *Vesperugo* species, the abundant North American *Nycticeius*, &c.; (b) the family *Nycteridae*, such as the large

Queensland form (*Megaderma gigas*) (fig. 3), the common Indian species (*M. lyra*), and the very peculiar genus *Nycteris* of the Ethiopian region;



Fig. 1.—The Greater Horseshoe Bat (*Rhinolophus ferrum-equinum*), flying.

(c) the family Rhinolophidae, very highly developed bats, with complicated sensory nasal appendages—e.g. *Rhinolophus* and *Phyllorhinus*; (d) the family Emballonuridae, cosmopolitan forms with obliquely truncated snouts—e.g. *Emballonura*, *Noctilio*, *Molossus*, the New Zealand *Mystacina*, &c.; and (e) the family Phyllostomidae, inhabiting Central and South America, and often characterised by nasal appendages, including the remarkable *Mormops*, the Vampire genus, the blood-sucking *Desmodus*, &c.—The known fossil forms, going back apparently to the Upper Eocene, are all highly specialised, so that the Chiroptera must have diverged from the Insectivora at a very early date.

Structure.—The membranes of flight, the short hind-legs, the capacious chest, the frequent presence of nose-leaves, have already been noticed as external features which at once catch the eye. Some of the characteristic structures must be noted, however, at greater length:—(a) *Skin*.—The skin is more highly developed in bats than in any other order of mammals. On the one hand it is modified to form the flying fold, extending (1) from the shoulder along the upper arm to the thumb; (2) between the four fingers, and thence onwards to the legs; (3) between the back of the legs and the posterior extremity of the body. On the other hand the skin comes into close association with the sensory function of touch which bats are well known to possess in such a remarkable degree. Spallanzani showed that bats deprived of sight, hearing, and smell, could in a marvellous way fly about a room without colliding with numerous threads hung across it; they could fly through crooked passages, and detect the approach of a hand and the like. Fine nerve-filaments are spread out on the skin of various regions, such as the sides of the muzzle, the outer ear, the nose-plaits, the wing-membrane, &c. The margins of the nostrils and glandular eminences on the sides of the snout are in many forms developed into curious, much folded, leaf-like appendages, kept soft by the secretion of numerous oil and sweat glands, and rendered sensitive by the abundant distribution of nerve-endings. In some cases attaching suckers are developed near the thumbs. Scent glands and bags are frequently present as secondary sexual characters. (b) *The skeleton*.—Three types of true wing occur among vertebrates. In the extinct Sanrian *Pterodactyls* (q.v.) the skin forming the wing was mainly stretched on the greatly elongated little finger. In the wing of birds the digits are greatly reduced and modified. In bats, the

bones of the palm (metacarpals) and joints of the four fingers are greatly elongated to serve as supports to the greater part of the membrane of flight. The clawed thumb is not included in

uterus, is discoidal and deciduate (see PLACENTA), and the two mammary glands are situated on the chest or under the armpits.

Habits.—Almost all the bats are nocturnal, and sleep during the day hitched up by their hind-legs, with their wings drawn over them. They come out in the twilight to hunt for food, and then their shrill squeak may not unfrequently be heard. The proverbial simile 'as blind as a bat,' must refer to their dazzled behaviour during the day, for they can see exceedingly well with their sharp eyes. Even apart from eyes they are able to steer their way adroitly, as the experiments of Abbé Spallanzani and others have shown. What Cuvier demonstrated in regard to the abundant distribution of nerves on various parts of the body is now known to be the correct explanation of their marvellous sensitiveness. It is also interesting to notice that the circulation of blood in the wings is so active as to amount almost to an inflammation—a suggestive fact in connection with their tender sense

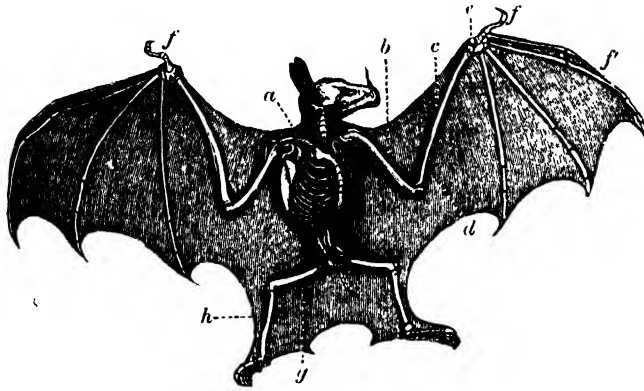


Fig. 2.—Skeleton of *Phyllostoma hastatum*:
a, clavicle; b, humerus; c, radius; d, ulna; e, carpus; f, thumb; f', finger;
g, femur; h, tibia.

of touch. Bats hibernate in winter, and are found in caves, barns, belfries, forests, &c. in large numbers. A minority feed on fruits, but most are insect-eaters, while a few (not including the vampire) suck the blood of small, and occasionally even of large mammals. The males and females often live apart.

Important Forms.—Among the large fruit-eating bats, the Flying Foxes (*Pteropus*): the Great Kalong (*Pteropus edulis*), the largest of the bats (14 inches long); the fig-eating South African *Epomophorus*; and the destructive Indian Fruit-bat (*Cynopterus marginatus*) may be mentioned as representative. Some of these do great damage to fruits of various kinds. Among the smaller insectivorous forms, the Vespertilio alliance includes the Horseshoe Bats, of which two species (*Rhinolophus ferrum-equinum* (fig. 1) and *R. hipposideros*) occur in Britain; the Lyre Bat (*Megaderma lyra*), often called vampires in India, and said sometimes to eat smaller bats, frogs, fish, &c.; the Desert Bat (*Nycteris thebaica*), which inflates its skin with air so as to form a balloon; the common Long-eared Bat (*Plecotus auritus*), often in church towers; the

(c) *Other structures*—The alimentary canal varies with the nature of food, being simpler and shorter in the insect-eating smaller bats. An exceptional type is exhibited by the blood-sucking *Desmodus*, where the blood is probably stored up in a long blind process from the stomach region. The brain is of a low type, but the tactile sensitiveness of the bats exceeds that of any other order. How the lips, nostrils, external ears, &c. come to be delicate organs of touch has been already noticed. The testes are on the abdomen or on the groin. The placenta by which the young bat—generally only one—is attached to the wall of the simple or horned



Fig. 3.—*Megaderma gigas*, sleeping.

been already noticed. The testes are on the abdomen or on the groin. The placenta by which the young bat—generally only one—is attached to the wall of the simple or horned



Fig. 4.—Barbastelle, walking.

Barbastelle (*Synotis barbastellus*); the Noctule (*Vesperugo noctula*), the Pipistrelle (*V. pipistrellus*), and two other species of *Vesperugo* occurring along with the four last-named bats in Britain; one of the two New Zealand bats (*Chalinolobus tuberculatus*); the Whiskered Bat (*Vespertilio mystacinus*), common in Europe, and also recorded in England. The thick-legged bats, or Emballonuridae, are represented by such forms as the Mountain Bat (*Emballonura monticola*), living

a social life on the solitary mountains of the Eastern Archipelago; the Tomb Bat of Egypt (*Taphozous perforatus*); the curious Egyptian Rhinopome (*Rhinopoma microphyllum*), abundant in the darkness of the Pyramids; the very ugly Collared Bats

FLYING FOX, VAMPIRE; also Professor Flower's article 'Mammalia' (*Encyclo. Brit.* 9th ed.); G. E. Dobson's *Catalogue of Chiroptera in British Museum* (1878); and the same naturalist's *Monograph of Asiatic Chiroptera*.

Batangas, a seaport town of the Philippines, the capital of a province in the south-west of the island of Luzon, 50 miles S. of Manila. It was founded in 1581, and is well built, lying on an extensive bay which opens into the Strait of Mindoro. Pop. of town and district, 27,000; of province, 275,075.

Batatas. See SWEET POTATO.

Bat'avi, an old Teutonic people who inhabited a part of the present Holland, particularly the island named from them *Insula Batavorum* (modern *Betave*), which is formed by the branch of the Rhine that falls into the sea near Leyden, by the Waal, and the Meuse. Their country extended southward across the Waal. Under Augustus they became allies of the Romans, and earned for their fidelity the honourable title of friends and brothers of the Roman people, and were permitted to choose their commanders from amongst themselves. Their cavalry were famous, and were often employed by the Romans.

Bata'via, properly the name of the island occupied by the ancient Batavi, became at a later date the Latin name for Holland and the whole kingdom of the Netherlands. The name Batavian Republic was given to the Netherlands on their new organisation of 16th May 1795, and they continued to bear it till they were converted into the kingdom of Holland, under Louis Bonaparte, 8th June 1806.

Bata'via, the capital of the Dutch East Indian possessions, stands on the N.W. coast of Java, near the mouth of the Tjiliwong, frequently called the Jaccatra, from the former native town, on the ruins of which the present city was built. The river, which is small and shallow, is connected with a network of canals which intersect the town. The influence of a vertical sun on the canals of this Holland in miniature made Batavia become proverbial as the grave of Europeans. The temperature, though not extreme, is oppressive from its uniformity, the mean of winter being 78.1° F., and that of summer only 78.6°. Latterly, however, the climate has been greatly improved by draining, and most of the merchants live in the healthier suburbs, which occupy higher ground farther inland, the principal being Weltevreden ('well-content'), Molenvliet, Rijswijk, Noordwijk, and Koningsplein. In some of these suburbs, which form the new town, the houses stand in spacious gardens with trees around them. The old town was formerly surrounded with walls and fortifications, and till 1808 was not merely government headquarters, but the main centre of population. But in that year the walls, useless since the complete subjugation of Java, were demolished, and the seat of government was transferred from the town on the swampy and unhealthy low grounds to Weltevreden, 2½ miles farther inland. Now the old town contains mainly shops, stores, offices, and the houses of natives and Chinese. During the day, however, it is a busy place; and in it are still the town-house, the exchange, the great poorhouse, a hospital, &c. The bay is spacious, but very shallow towards the shore, and is yearly becoming shallower. Batavia is accessible only to boats; and since 1880 the government has constructed a great harbour some distance to the eastward at Tanjong Priong, connected with the capital by road, rail, and canal. To seaward the bay is protected by a range of islands and sandbanks; and it therefore affords a very secure anchorage. Notwithstanding the

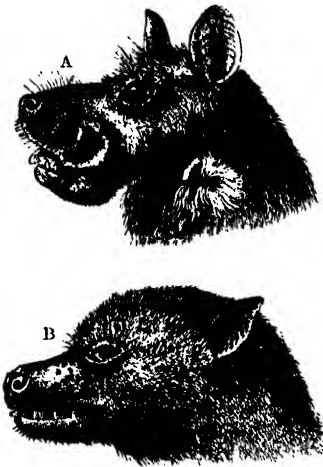


Fig. 5.—Heads of (A) *Epomophorus gambianus*, (B) *Pteropus rodericensis*.

with folded skin (*Chiroptes torquatus*); the short-tailed New Zealand Bat (*Mystacina tuberculata*), which is fonder of walking than most of its kind. This species of bat, and the *Chalinolobus* noted above, 'represent the whole indigenous mammalian fauna of New Zealand.' The 'vampires,' or

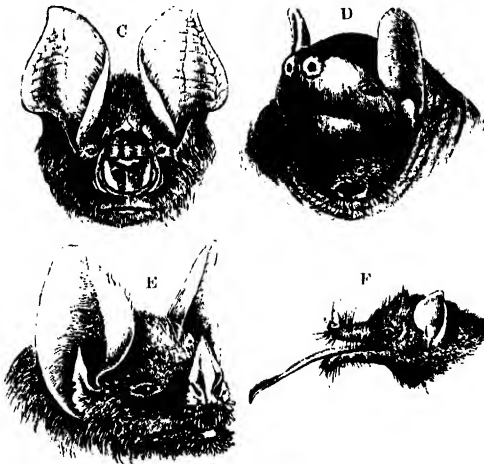


Fig. 6.—Heads of (C) *Phyllorhina tridens*, (D) *Chiroptes torquatus* (female), (E) *Trachyops cirrhosus*, (F) *Chaeronycteris mexicana*.

Phyllostomidae, include a number of blood-sucking forms, but the chief guilt in this connection must be laid to the charge of *Desmodus*, which sometimes attacks mammals of considerable size, and even man. The Vampire Bat itself (*Vampyrus spectrum*) must be acquitted.

Bats form an order of great interest and importance to the naturalist. From a practical point of view they are of some importance so far as the one set destroy fruit-crops, and the others make up for this by destroying insects, while only a very few are somewhat more sanguinary. See MAMMALIA,

growing prosperity of Singapore, Batavia continues to be the commercial emporium of the far East. Its markets present at once all the productions of Asia and all the manufactures of Europe. There is frequent communication by steam with Singapore, all the Dutch East Indies, and Australia. The chief exports are coffee, rice, indigo, hides, arrack, sugar, palm-oil, cajuput-oil, tin, pepper, teak, buffalo horns and hides, tea, cassia, sapan wood, tortoise-shell, and tamarinds. The imports comprise cottons, woollens, silks, machinery, iron goods, wine, butter, articles of luxury, and ice (from America). The duties, formerly very high, have been reduced since 1866. The total value of exports is reckoned at £1,500,000; of the imports, £2,000,000. About half of the total trade is with Holland. Batavia possesses, besides the citadel and government offices, a society for the arts and sciences, founded 1778; a society for the study of Eastern geography, ethnography, and languages; a national history society, a chamber of commerce, an agricultural society, a gymnasium, a medical school, and various other educational and learned institutions. In 1811, while Holland was under France, Batavia was taken by the English, but was restored to its former owners in 1816. The Dutch government has laid a telegraphic cable of 600 miles from Batavia to Singapore. There is a railway from Batavia to Buitenzorg and other points in the interior. Pop. (1885) 92,193, of whom 6000 are Europeans—Dutch, Portuguese, and half-breeds; 65,000 Chinese; 1500 Moors and Arabs; besides Javanese and Malays.

The province of Batavia is low, but rises gently towards the south. Pop. nearly a million, of whom 8000 are Europeans, 70,000 Chinese, and the remainder mostly natives. The religion is chiefly Mohammedan. See JAVA.

Batavia, a post village of Western New York, on Tonawanda Creek, 36 miles N.E. of Buffalo by rail. It has several mills, and manufactures of sashes and blinds, ploughs, and farming-implements, and is the seat of the state institution for the blind (1868). Pop. (1880) 4815; (1890) 7200.

Batchian. See MOLUCCAS.

Bates, HENRY WALTER, F.R.S., naturalist and traveller, was born at Leicester, 8th February 1825. During his apprenticeship to a manufacturing hosier, he formed a friendship, due to kindred love of natural history, with Mr Alfred R. Wallace, then master in the Collegiate School. In April 1848 the two left to explore the Amazons, where Bates remained till June 1859. In 1861 he published his distinctive contribution to the theory of natural selection in a paper explaining the phenomena of Mimicry (q.v.). The narrative of his travels, *The Naturalist on the Amazons*, which at once took high rank, appeared in 1863. In 1864 he was appointed assistant-secretary of the Royal Geographical Society, which post he filled till his death, 16th February 1892. Bates was pre-eminently a philosophical naturalist, his special study, that of beetles, being mainly for the light which that vast order throws on the theory of descent.

See the Obituary in *Proc. Roy. Geog. Soc.*, April 1892; *The Naturalist on the Amazons* (reprint of 1st edition, with memoir by Edward Clodd, 1892).

Bath, the chief city of Somersetshire, is beautifully situated in the wooded valley of the sinuous Avon, 11½ miles ESE. of Bristol, and 107 W. of London. Its houses are built wholly of white free-stone—'Bath oolite,' worked in the neighbouring quarries—brick being entirely discarded (see BATH-STONE). Set in a natural amphitheatre, with Lansdown Hill (813 feet) to the north, the city has a finer appearance than any other in England, the variety of level giving very

commanding sites for its fine and regular streets, crescents, circles, and public buildings. The beauty and sheltered character of its situation, the mildness of its climate, and especially the curative efficacy of its hot chalybeate springs, have long rendered Bath a favourite fashionable resort. The springs, which supply several baths, were known to the Romans, who here in the 1st century A.D. built baths, of which extensive remains were discovered in 1755 and again in 1881. A large portion of these has been uncovered, including an oblong bath 83 feet in length by 30 in breadth, and a circular bath 25 feet in diameter. The temperature of the springs varies from 97° to 120° F.; they rise near the river-bank, in the centre of the city, and discharge about 185,000 gallons of water daily. The water is most useful in bilious, nervous, and scrofulous complaints, palsy, rheumatism, gout, and cutaneous diseases. Though the gaiety of Bath has greatly waned since the days of Beau Nash (q.v.), there has been a great general improvement in the city. It has a beautiful park (1830), and many open spaces; a theatre, concert-rooms, and other places of amusement; the literary and scientific institution, museum, club-houses, good hotels, &c. Noteworthy edifices are the Assembly Rooms (1771), the Guild-hall (1766), the Pump-room (1797), the Mineral Water Hospital (1737–1861), the City Markets (reconstructed 1863), and the new baths (1887). The Abbey Church (1499–1616) is a cruciform Late Perpendicular structure, with a fine fan-tracery ceiling in the style of Henry VII.'s chapel, and a central tower 162 feet high. In 1864 and subsequent years the interior was thoroughly restored by Sir G. G. Scott at a cost of £30,000. Of numerous other churches the finest is the Roman Catholic Priory Church (1863), with a spire 200 feet high. On Lansdown Hill is Beckford's Tower, 130 feet high, built by the eccentric author of *Vathek*. South of the city is Prior Park, built in 1743 by Ralph Allen, Fielding's friend, and now a Catholic college. There are several other educational establishments—the Bath College, the Royal School for Officers' Daughters, the Wesleyan College, &c. Bath returns two members to parliament, and conjointly with Wells is the seat of a diocese. It has no manufactures of importance; but it has given name to a kind of bun, to wheeled invalid chairs, and to bricks used for cleaning metal. Coal is found in the neighbourhood. Pop. (1881) 51,814; (1891) 51,813. Traditionally founded by a British prince, Bladud (863 B.C.), Bath is really of great antiquity. It was a Roman station called *Aquæ Solis*, at the intersection of the great Roman ways from London to Wales, and from Lincoln to the south coast of England. The site of the Roman forum is known; and remains have from time to time been discovered of temples, altars, and pavements. Richard I. granted Bath its earliest extant charter, which was subsequently confirmed by Henry III., and greatly extended by George III. Bath figures frequently in literature, in the works of Smollett, Fielding, Austen, Madame D'Ablay, Miss Austen, Dickens, &c.

See Warner's *History of Bath* (1891); Searth's *Aquæ Solis* (1864); Sir G. Jackson's *Archives of Bath* (2 vols. 1873); and Peach's *Bath, Old and New* (1888).

Bath, a city and port of entry, capital of Sagadahoc county, Maine, U.S. It is situated on the west bank of the Kennebec River, 35 miles S. of Augusta. Shipbuilding is the chief industry, in which it takes high rank amongst American cities. It is an important commercial centre, and owns much shipping, as its river possesses good anchorage and docks, and the harbour never freezes over. Bath was incorporated as a town in 1780, and as a city in 1850. Pop. (1870) 7371; (1880) 7874; (1890) 8723.

Bath, BATHING. As usually understood, bathing is the application of water in some form to the body, as in ordinary cold baths, hot baths, or sea-bathing. But many other substances, liquid, solid, or gaseous, may be substituted for water—e.g. mud, seaweed, air; and the baths take different names according to the nature of the substance, its condition, its method of application, or the part of the body to which it is applied—e.g. salt-water bath, hot salt-water bath, salt-water spray-bath, salt-water arm-bath. It may be presumed that at first bathing in cold or in hot water was simply a cleansing or cooling act; then it would develop into a therapeutic process, as a remover of stiffness, pains, and fatigue, and as a preventive or cure for the skin diseases so prevalent in the East; and so it would ultimately become with some peoples a religious and solemn rite. The great step of substituting hot air for hot water in the first stage of the bath took place probably in Phœnicia, that cradle of so many arts, as cinders and other signs of the existence of such baths have been found in the ruins of Baalbek ('the house of Baal'). Thence to Greece was an easy transition, and we know there were many both public and private baths there, the former connected with the gymnasium; while there is also evidence that there were separate institutions for women. Homer tells us that Athena instructed Hercules how to use certain baths, so as to recover his strength after severe exertions, and also that Andromache prepared a hot bath for her husband Hector on his return from battle. The Romans, when they subjugated the Greeks, acquired the bath along with other fruits of their conquest, and carried it to such a pitch of splendour and luxury as it has never since equalled. There were no fewer than 850 baths in Rome at one time, and some of these accommodated thousands of bathers. It will give some idea of their extent and magnificence to quote from Fergusson's *Handbook of Architecture* the following: 'St George's Hall at Liverpool is the most exact copy in modern times of a part of Caracalla's baths.' The bath became such an institution with the Romans, that apparently they could not live without them, and wherever we find Roman remains, we find traces of a bath as well. Thus their use spread throughout Europe, Asia, and Africa, and there is very little doubt that the first Turkish baths were really built by the Romans, and were retained in use through the subsequent centuries on account of their suitability to the climate and to the manners of the people; while in the more northern climes they ceased to be of public importance, until their reintroduction in modern times under the name of Turkish baths. It is unnecessary to enter into a minute description of the Roman bath, as it so closely resembled its modern offspring the Turkish, which will presently be described. The chief points of difference are that the lubricating of the body with oil in the apodyterium, and the practising of various exercises and games in the hall called the sphaeristerium, have been omitted in the modern baths.

Hot-air Bath.—(1) In the form generally known as the Turkish bath, there are usually two rooms filled with air heated by stoves placed either inside or outside the rooms. One of these, the tepidarium, has a temperature of about 120° F., while the other, the calidarium, or sudatorium, runs up as high as 220° F. or even higher. In these the bather, with only a cotton loin-cloth and slippers to protect his feet, reclines on marble benches covered with felt, or canvas-covered chairs, until the perspiration runs from every pore. He then passes into the lavacrum, where on a marble slab he undergoes the process of shampooing, the bathman kneading, rubbing, and

thumping every part of his body, until all the loosened epidermis or outer skin, which has been softened by the hot air and perspiration, is removed. He is then soaped over and sprayed or douched with warm water, which is gradually cooled down till it runs perfectly cold, after which he plunges through a cold bath and enters the frigidarium, where he lies comfortably on a couch with a soft dry sheet round him, and reposes for half an hour or longer, sipping a cup of coffee, before dressing to emerge into the outer world again. During this period of repose the bather enjoys a singularly delicious sensation of perfect well-being.

(2) In another form of this bath, which can be taken at home, the hot air is produced by a lamp placed under a wooden cushioned chair, on which the bather sits closely enveloped in blankets fastened tightly round his neck. When the perspiration has broken out freely, the blankets are unfastened, and the body bathed with tepid water, after which the bather lies on his bed or a couch, lightly covered, until the skin feels cool and comfortable. In this, as in most of the other baths to be described, there are innumerable small modifications which need not be discussed here.

Vapour-bath.—(1) That commonly known as the Russian bath consists of a room filled with steam, where the bather sits on benches arranged as in an amphitheatre, so as to give different temperatures according to the height above the floor, until he perspires freely; after which, switching with birch-twigs takes the place of shampooing, and then free application of cold water, carried to the length even of rolling in the snow, completes the process.

(2) A simpler form, where, as in the second form of the hot-air bath, the bather's head is kept outside the bath, sitting as he does either in a wooden box with a hole for his neck, or on a chair as in the hot-air bath, but with a basin of boiling water instead of a lamp beneath it. In this basin there are placed one or two red-hot bricks, or a little quicklime is added to produce abundant vapour. A rude variety of vapour-bath, where the bather is placed in a hole or cabin, is practised amongst the Irish, the Finns, and some other nations.

Medicated, Hot-air, Vapour, and Water Baths.—In these baths some foreign material is added, as bran, sulphur, carbonate of soda or potash, mercury, nitro-muriatic acid, mustard, extracts of pine-leaves, eucalyptus, lavender, conium, seaweed (known as ozone-baths), or mud (either spring or sea).

Baths of the natural mineral water are also given at nearly all the spas at home and abroad; but the subject, with the classification of such baths, will be best discussed at MINERAL WATERS, of which, therapeutically, the most valuable are those containing sodium, magnesium, iron, carbonic acid, sulphur, and hydrosulphuric acid. Natural hot-air baths are given by exposure to strong sunshine, which, if only the head is protected, can be well borne by the naked body. In the salt-districts, as at Droitwich, strong brine-baths are administered. In these curious baths the body has to be held down, as its specific gravity is not sufficiently great to allow it to submerge itself. Wrapping the body in the hide of a newly killed animal is known as an animal-bath. Compressed-air Baths are discussed in a separate article. See also HYDROPATHICS.

Electric Bath.—In this bath, while one pole of the battery is connected with the bath, and thence the electricity passes through the water, the other pole is connected with an insulated bar, to be grasped by the patient while lying in the bath, or with a sponge which can be applied locally as desired. A switch arrangement is usually connected with the bath, by which the direction of the current can be

reversed, or by which it can be sent to a coil, so that faradaic electricity can be applied instead of the galvanic variety. Another switch can also be had which will allow of any desired number of cells being brought into the circuit.

Effects of Hot and Cold Baths.—Hydrotherapeutics, or the science of treating disease by bathing, must now have our attention, in order that we may briefly explain the use of these various baths. No valuable curative agency has suffered so much discredit from over-laudation as has water. Its importance as a therapeutic agent is naturally immense, seeing the great importance of the skin, which is not only one of the chief excreting glands of the body, but regulates the heat-producing function of the system (see SKIN, TEMPERATURE OF THE BODY). It is truly marvellous that, be the external temperature below zero or over 100° F., the temperature of the body remains invariably at about 97° F.; and this result is effected by the skin. Hence the importance of maintaining the latter in perfect health, and this is best attained by bathing. As mentioned previously, all the chief baths are founded on the principle of applying heat and some mechanical friction, and then cold. It is thus seen that water is practically merely the vehicle for the application to the body of the great forms of energy, heat, cold, mechanical friction, and electricity, and of various medicinal substances in solution, so that really it is a fiction to call such treatment distinctively the *water-cure*. The effects of the treatment are that the heat and friction open and stimulate the pores of the skin, dilate the small blood-vessels, and excite to their highest action the terminal nerve-fibres, while the effete scales of the epidermis are loosened and removed; and after all this has been effected, cold is applied to check the action and restore these various parts to their normal quiescent condition. Not only are unhealthy skins thus restored to their normal condition, but the effect is transmitted to the body as a whole, which is stimulated to healthy action; and thus we are able to understand how it can be claimed for baths that they produce at first sight apparently opposite effects of reducing corpulence and increasing body weight, their tendency being to bring the body to the normal line, from whichever side it may have previously deviated.

But besides this general tonic effect, bathing can also produce numerous local beneficial results. In inflammations or congestions of various organs, hot water applied either as a bath or continuous douche, or in the form of fomentations, gives great relief; while in many of the same class of cases, cold water in the form of a pack, or pounded ice in a waterproof bag, is equally effectual. The patient's own feeling, and the general rule that *heat* should be preferred in weak constitutions, must be our guides as to which form to employ. In piles, a hot ascending douche, and in various women's diseases, other kinds of douche, are invaluable. *Very* hot water is a most successful hæmostatic agent. Wounds are often best treated by water applications, and in cases of great laceration, submerging the part in an antiseptic bath is a cleanly and soothing plan for healing. Diseases of the ear, nose, mouth, and throat are often best treated by sprays of either simple or medicated water. Many lesions of the spinal cord are very much relieved by douches, the spinal ice-bag, or the rubbing wet-pack. Cases of insanity, and specially cases of delirium tremens, derive great benefit from the judicious use of baths.

The treatment of fevers by cold baths, especially those cases in which the fever runs very high, is a comparatively new method, and is much esteemed, particularly in Germany. It has cer-

tainly worked wonders in many instances. The cold may be applied by affusion, wet packs, ice-bags, or baths. The last method is probably the safest and most comfortable for the patient. He is placed in a bath of about 97° F., and the water is gradually cooled down to 60° F. or even lower, after which his body is wiped dry and he is replaced in bed, the process being repeated when the temperature rises again. Baths help the elimination of various poisons, such as lead and mercury. The electric bath is useful both as a stimulant to paralysed nerves and muscles, and as a soother of pain in acute cases. In nearly all forms of skin disease, baths, simple or medicated, are highly desirable. A sulphur-bath is a pleasant and more cleanly method of curing itch than the treatment by sulphur-ointment. In this, as in the other cases, it would be out of place here to enter into a discussion as to the precise rules for guidance, which must be looked for by those who desire them in the various and numerous text-books or treatises on these subjects.

The terms *water-bath*, *sand-bath*, and *electro-plating bath* are used in chemistry and the various arts. The first two are contrivances by which vessels can be heated without immediate contact with the fire, an obvious advantage in many cases; while an electro-plating bath is a solution of silver or other metals which will deposit the metal on suitable substances immersed in it.

Hints to Bathers—Sea-bathing.—It may be laid down that a daily bath of some form or other is useful and beneficial to every one; but all persons whose health is not up to the normal standard ought to obtain competent advice as to the variety of bath which will probably suit them best, and as to how and when they ought to take it. Sea-bathing is probably the most bracing and the best form for the robust; but in our climate, except for a very short time of the year, when the weather is exceptionally fine, it is unsafe for the non-robust, and absolutely dangerous for the delicate. For the latter, bathing under cover is much safer, and this generally implies bathing in fresh water. The popular idea that bathing frequently repeated in fresh water is weakening is a complete fallacy, though salt water is probably superior in some respects, except for persons with very irritable skins. Whatever the form of bath chosen may be, it should never be taken immediately after a full meal, but should be indulged in either after a very light refreshment in the morning, or after two or three hours have elapsed since the last meal; the time varying with the character and quantity of the food which has been eaten.

The duration of the bath must vary with the health and feelings of the patient and with the temperature of the water and air at the time. If a warm glow cannot be obtained almost immediately after emerging from a cold fresh or salt water bath, then the bather may be quite sure it has been indulged in too long; while if such a glow cannot be raised at all, or if a certain duskiess of skin be produced, he may be certain cold bathing alone does not suit his constitution. Many delicate persons can only enjoy a cold bath with safety after a previous application of hot air, water, or vapour—hence one of the advantages of the more elaborate baths, such as Turkish and vapour baths. In regard to Swimming (q.v.) it may be pointed out that in this art we have a combination of bathing with a capital form of exercise, which enhances for the young and robust the advantages of the simple bath.

Public Baths.—The usefulness of such institutions is self-evident. In 1846 an Act was passed by parliament to enable borough councils and parish vestries to establish baths and wash-houses, to be

supported by the rates; and the Act of 1878, amended 1880, authorises the establishment of cheap swimming-baths. In such baths it is found almost essential that there should be separate baths for different classes of bathers. Equally essential are good ventilation, proper heating of the water, and means for restoring suspended animation and for rescuing those in danger of drowning. A very simple, handy, and effective apparatus for this last purpose is a long light bamboo rod. Club baths offer facilities only to such as are members of the club.

Bath, ORDER OF THE. The name of this English order of knighthood is derived from the ceremony of bathing, which used anciently to be practised at the inauguration of a knight, as an emblem of the purity henceforth required of him by the laws of chivalry. The order does not seem to be older than the reign of Henry IV., who, at his coronation in 1399, made 46 esquires Knights of the Bath. Knighthood of the Bath was afterwards from time to time conferred on occasion of great national ceremonials. Charles II. made 68 Knights of the Bath at his coronation, but from that time the dignity fell into oblivion till revived by George I. in 1725 as a military order, consisting of the sovereign, a grand-master who should be a prince of the blood, and 36 knights. At the conclusion of the great war, it was thought expedient, with a view to rewarding the merits of many distinguished officers, both military and naval, to extend the limits of the order, which was effected on the 2d January 1815. But the order was still purely military, and it was not till 1847 that it was placed on its present footing by the admission of civil knights, commanders, and companions. In June 1861 it was further enlarged. The following is its present organisation:

First Class.—Knights Grand Cross (G.C.B.); the number not to exceed, for the military section, 50, exclusive of the royal family and foreigners; and for the civil, 25. The knights of the military section must be of or above the rank of major-general in the army or rear-admiral in the navy.

Second Class.—Knights Commanders (K.C.B.); military, 102, and civil, 50, exclusive of foreigners. These, like the first, have the title *Sir*, and take precedence of Knights Bachelors. The military knights must be of or above the rank of colonel in the army or captain in the navy.

Third Class.—Companions (C.B.); military, 525, and civil, 200. They take precedence of Esquires, but are not entitled to the distinctive appellation of knighthood. No officer can be nominated to the military division of this class unless his name has been mentioned in the *London Gazette* for distinguished services in action; and the order has never been conferred on an officer below the rank of a major, or commander in the navy. The number of the second and third classes may be increased under special exigencies.

The officers of the order are the Dean (who is the Dean of Westminster), Bath King of Arms, the Registrar and Secretary, and the Gentleman Usher of the Scarlet Rod. On the revival of the order in 1725, Henry VII.'s chapel at Westminster was made the chapel of the order, where the stall-plates and banners of the knights were placed over their stalls. But since 1815 there has been no installation of a knight, and the stalls do not now afford sufficient accommodation for the increased numbers of the order.

The insignia belonging to the first class are the collar, badge, ribbon, star, mantle, surcoat, under habit, and cap. The collar is of gold, composed of nine imperial crowns and eight roses, thistles, and shamrocks, issuing from a sceptre and ena-

melled of their proper colours, all united together with seventeen knots enamelled white. The badge of a military G.C.B. is a gold Maltese cross enamelled white, each of its eight points terminating



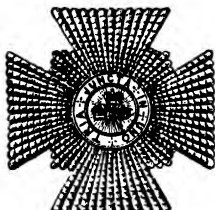
Star, Collar, and Badge, G.C.B. (Military).

in gold balls, and in each of the four angles a lion of England; in the centre, on a ground of white enamel, are the rose, thistle, and shamrock, issuing from a gold sceptre between three gold imperial crowns, within a red circle charged with the motto of the order, *Tria juncta in uno*, and surrounded with two branches of laurel in proper colours, issuing from an escrol of blue enamel, containing, in gold letters, the legend *Ich dien*. The badge of a civil G.C.B. is an oval entirely of gold, the external fillet containing the motto of the order, and encircling the above device of the rose, thistle, shamrock, sceptre, and three crowns. The badge is suspended from the collar on occasions when the latter is worn; at other times it hangs from a broad red ribbon placed across the left shoulder. The star of a military G.C.B. is formed of rays of silver, thereon a gold Maltese cross charged with three imperial crowns, one and two, within a circle of red enamel charged with the motto of the order in gold letters, and surrounded by two branches of laurel issuing from an escrol like that of the badge. That of a civil G.C.B. has the same circle and central device, with rays of silver in the form of a glory issuing from the centre. The mantle is of crimson silk, lined with white silk, with the star embroidered on the left side, and a lace of white silk on the left shoulder. The surcoat is of the same materials as the mantle. The cap is of black velvet, with a plume of white ostrich feathers.

The insignia of the second class are the badge, ribbon, star, mantle, under habit, and cap. The badges, military and civil, are like those of the first class, but smaller, and the ribbon is narrower. The star of the military K.C.B. differs from that of the military G.C.B. in omitting the Maltese cross, and is in form a cross patée. The star of a civil K.C.B. differs from that just described in omitting the branches of laurel and the escrol and its legend. The mantle and cap are nearly similar to those of the G.C.B.

Companions of the Bath have for insignia only the badge, civil or military, as above described, but of still smaller size. It is fixed to a gold swivel with a bar of the width of the ribbon, and fastened to the coat with a gold buckle.

Knights Grand Cross of the Bath are entitled to supporters. Both G.C.B. and K.C.B. place a red



Badge and Star, K.C.B. (Civil).

circle containing the motto of the order outside the arms, with the badge suspended from it, military knights having outside the circle the two branches of laurel, escrol, and legend, as above. Companions attach the ribbon and badge to the lower part of their shield.

Bathgate, a town of Linlithgowshire, 20 miles W. by S. of Edinburgh by rail. Freestone, coal, carboniferous limestone, and bituminous shale have been extensively wrought in the vicinity—the last since 1852. There are also large paraffin and paper works, a distillery, &c. In 1824 the town was constituted a free burgh of barony, in 1865 a police-burgh. Its chief buildings are the corn exchange, the academy, and the new parish church—a Norman edifice of 1884, with a clock-tower 108 feet high. Sir James Simpson was a native. Pop. (1881) 4887.

Bathometer. See SOUNDING.

Bath'ori, ELISABETH, the niece of Stephan Bathori, king of Poland, and wife of the Hungarian Count Nádasdy, was born in the latter half of the 16th century. Her diabolical cruelty has condemned her memory to eternal infamy. It is said that she used to cause young girls to be put to death in the dungeons of her castle with the utmost cruelty, that she might renew her own youth from time to time by bathing in their warm blood. The details of the monstrous story are probably exaggerated, but it at least shows that she was conceived capable of it. When at length, in 1610, inquiry was made into the appalling rumours, it was discovered that this female fiend had caused to be murdered no fewer than 650 maidens. Her accomplices were burnt; but she was shut up for life in her fortress of Csej, where she died in 1614. See Baring-Gould's *Book of Werewolves* (1865).

Ba'thos (Gr., 'depth') is a term employed by critics to designate a ludicrous descent from the elevated to the commonplace in writing or speech, or a sinking below the ordinary level of thought in a ridiculous effort to aspire (see CLIMAX). It is of the essence of bathos that he who is guilty of it should be unconscious of his fall, and while grovelling on the earth, should imagine that he is still cleaving the heavens. A good example of bathos is the well-known couplet:

And thou, Dalhousie, thou great god of war,
Lieutenant-general to the Earl of Mar!

or the well-known encomium of the celebrated Boyle: 'Robert Boyle was a great man, a very great man; he was father of chemistry and brother to the Earl of Cork.'

Bath-stone, a building-stone extensively used in England on account of its beauty, is obtained from quarries in the Lower Oolite, in Wiltshire and Somersetshire. It is fine grained, of a rich cream

colour, and is composed of about 94½ per cent. of carbonate of lime, and 2½ per cent. of carbonate of magnesium, but is free from silica. It is easily wrought in the quarry, some beds cutting almost as readily as chalk, and hardens on exposure to the air, but is not very durable. Within twenty-five years after the repaving of Henry VII.'s chapel in Westminster Abbey, with this stone, it had begun to decompose.

Bathurst, a name applied to various localities in honour of Earl Bathurst, Colonial Secretary (1812-28).—(1) BATHURST in New South Wales, the first county settled beyond the Blue Mountains (q.v.), which were long believed to be impassable. It was not before 1813 that a practical route was formed. Bathurst was still further distinguished as the seat of gold-fields, discovered in 1851. The county is bounded on the N.E. by the Macquarie, and on the S.W. by the Lachlan; it is well watered, and has a moderate temperature. The whole district is admirably suited for pastoral pursuits. Besides the gold-fields, slate-quarries and copper-mines are also worked, while silver mining has become the leading industry. The chief town, Bathurst, on the Macquarie River, 144 miles W. of Sydney, is now the third in New South Wales, and is a handsome city with numerous elegant public buildings. Erected into a municipality in 1862, it is connected with Sydney by rail, and is well supplied with churches and schools. Bathurst contains a government railway workshop, and has breweries, tanneries, flour-mills; soap, candles, glue, and boots and shoes are also largely manufactured. It is the seat of an Anglican and of a Roman Catholic bishop. Pop. (1881) of city, 7221; of district, 17,391.—(2) BATHURST ISLAND, off North Australia, about 12° S. lat., and 130° E. long. It is included in the northern territory of South Australia, and is close to the much larger Melville Island, and is partly wooded, partly barren.—(3) BATHURST, the principal settlement of the British colony on the Gambia (q.v.). It is situated on St Mary's Isle, a sand-bank at the mouth of the river. The stores of the European merchants face the river, as well as the government house, barracks, and hospital. Pop. about 8000.—(4) An island in the Arctic Ocean, intersected by the 100th meridian, and situated immediately beyond the 75th parallel.—(5) BATHURST ISLET, an arm of the Arctic Ocean, projecting due south for about 75 miles into the North American continent, just touching the Arctic circle and 110° west longitude.—(6) A division in the east of Cape Colony, formed from the district of Albany, contains Port Alfred, Bathurst, and other small towns.

Bathurst, EARL, a title conferred in 1762 on ALLEN BATHURST (1684-1775), a Tory statesman, and the friend of Pope, Swift, Congreve, Prior, and Sterne. He had been raised to the peerage forty years before as Baron Bathurst.—His son HENRY (1714-94), second earl, sat for Cirencester from 1735 to 1754, and from 1771 to 1778 was Lord Chancellor—'one of the weakest, though one of the worthiest,' that ever sat on the woolsack.—His son HENRY (1762-1834), third earl, was Secretary for the Colonies from 1812 to 1828. To the same family belonged Henry Bathurst (1744-1837), from 1805 Bishop of Norwich, the 'only Liberal bishop' of his day; and his son Benjamin (1784-1800), who disappeared mysteriously between Berlin and Hamburg, as he was travelling with despatches from Vienna.

Bathybius, the name given to a supposed low form of life found at the bottom of some parts of the deep sea, but usually regarded with much scepticism. In 1857, during the explorations connected with laying the Atlantic cable, attention was first directed to the presence at great depths of

a slimy mass which was first described by Professor Huxley in 1868, and called, in honour of Professor Haeckel, *Bathynus haeckelii*. The supposed organism consisted simply of formless masses of slime without any detectable structure, and containing numerous curious limy concretions. In the same year, Sir Wyville Thomson and Professor W. Carpenter had, in the *Porcupine* expedition, opportunity of examining bathynus in its fresh and apparently living state; and in 1870 Haeckel published a more detailed account of this apparently simplest form of life. His description, like that of Huxley, was wholly based, however, on preserved specimens. Apparently simpler than any of the lowest forms of life (*Monera*) which had been previously discovered, bathynus excited great interest. From the results of the *Porcupine* dredging it was expected that this living slime would be found abundantly diffused in the great depths; but this hope was cruelly disappointed. During the prolonged explorations of the *Challenger* (1872-76) the bathynus was not rediscovered. Nor was this all; for Mr John Murray was led to suspect that what had been regarded as living matter was only a gelatinous precipitate of sulphate of lime from sea-water mixed with alcohol. So strong was his suspicion, that he withdrew his previous opinion as to the existence of any such organism. Huxley regarded this step as justified, and also abandoned bathynus to its fate. This instance of the fallibility of modern scientists has not unnaturally been taken advantage of by opponents, and made the basis of large assumptions as to the general shakiness of scientific conclusions. Haeckel, however, refused to abandon his namesake, and his characteristic constancy of opinion has been to some extent justified by the fact that in a later North Polar Expedition (1876) Dr Bessels discovered a similar quasi-organism, which he named *Proto-Bathynus*. This was dredged in abundance in Smith's Sound from a depth of 92 fathoms, and its appearance and movements seemed to be those of a living organism. It is regarded by some, however, as merely the result of the protoplasmic debris of larger protozoa which sink down to the bottom as they die. The case for or against the existence of such a low form of life is therefore at present doubtful, and must await further exploration. Apart, however, from this special point, it is of more importance to note the fact that the researches of Haeckel, Cienkowski, Zopf, and others, have resulted in our acquaintance with a large number of exceedingly simple organisms, which Haeckel calls *Monera*, and which are only at most a step above bathynus. See LIFE, MONERA, PROTOZOA, PROTOPLASM, SPONTANEOUS GENERATION, &c.

Bathymetry, the art of measuring depths in the sea, especially for the purpose of investigating the vertical range of distribution of plants and animals. An extensive series of such bathymetric measurements was made by H.M.S. *Challenger* (1872-76), the deepest made being at 4575 fathoms.

Batignolles, a northern suburb of Paris.

Batiste, the usual French name for cambric, applied in commerce to a fine texture of linen or cotton. According to Littré, the word is due to the name of the original maker. Baptiste, whose statue still stands at Cambrai; according to others, to its use in wiping the heads of children after baptism.

Batjan. See BATCHIAN.

Batley, a manufacturing town in the West Riding of Yorkshire, 8 miles SW. of Leeds; since 1868 a municipal borough, associated for parliamentary purposes with Dewsbury, 1 mile distant. Batley has about 50 mills and factories, being a

chief seat of the shoddy and heavy woollen manufactures—army cloths, flushings, pilots, druggets, &c. It has a town-hall (1864-74); an old parish church, Perpendicular in style; some 30 other churches; a free grammar-school (1612; reconstituted 1874); a chamber of commerce; a mechanics' institute; waterworks (1871-78); and a market-house. The population has increased rapidly; (1851) 9308; (1871) 20,871; (1881) 27,514.

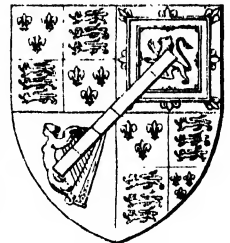
Batman (Fr. *bât*, 'a pack-saddle'), the soldier-groom of a mounted officer. Every officer in the British army, when doing duty with his regiment, is allowed to employ a soldier as body-servant, and if mounted, a second as groom. These men are struck off all ordinary guards and duties, and receive from the officer a small monthly addition to their pay. On the march and on active service they take their places in the ranks.—*Bât* horses are baggage animals—not chargers.

Batn-el-Hajar ('Womb of Rocks'), a stony district of Nubia, stretching along the Nile in the neighbourhood of the third cataract. The Nile, in the upper portion of the district, is often forced by the approaching rocks into a very narrow channel, and its navigation is frequently interrupted by small islands, rocks, and rapids. The granite hills in some parts attain a height of 2000 feet above the river.

Baton is the name of a short staff, presented by the sovereign to each field-marshal, as the symbol of authority. It is also the name of the long staff carried by the drum-major of an infantry regiment. Baton is also the name of the policeman's truncheon, and of the rod wielded by the conductor of an orchestra. (The French *baton* originally meant simply a stick.)

Baton Rouge, a city on the east bank of the Mississippi, 129 miles above New Orleans, from 1847 to 1862, and again since 1880, the capital of the state of Louisiana. It was one of the earliest French settlements, and as far back as 1838 was the seat of a college. Baton Rouge contains a national arsenal and barracks, a military hospital, an asylum for the deaf and dumb, state penitentiary, an elegant state-house, and several churches. The district is very fertile, producing large quantities of cotton, sugar, and maize. Baton Rouge was more than once the scene of important operations during the civil war. It was occupied by Federal troops after the capture of New Orleans, and defended by General Williams, who fell in fighting against the Confederate general Breckinridge, August 5, 1862. Pop. (1870) 6498; (1880) 7197; (1890) 10,478.

Baton-sinister, a well-known heraldic indication of illegitimacy. It is a diminutive of a Bend-sinister (see BEND), one-fourth of its width, and comped at the ends—i.e. not extending to the sides of the shield, so as to resemble a marshal's baton or truncheon laid diagonally over the family arms from sinister to dexter. From the 15th century onwards it has been largely assigned in England to the illegitimate issue of the royal family. Heraldry says that it may be of metal in the case of bastard descendants of royalty, but in other cases should be of colour, even though placed on colour. In the example represented, the arms of the Duke of Grafton (descended from an illegitimate son of Charles II.), the baton-sinister



Baton-sinister.

is composed of six pieces argent and sable. The terms 'Bar-sinister', or 'Bastard Bar' are often erroneously used for Baton-sinister; the former, for instance, is of frequent occurrence in Thackeray's *Esmond*.

Batoum', or BATUM', a town of Russian Transcaucasia, on the eastern shore of the Black Sea, 201 miles W. of Tiflis, and 575 of Baku, by a railway completed in 1883. The Berlin Congress of 1878, in sanctioning the cession of Batoum by Turkey to Russia, stipulated that it should not be made into a naval station, but should remain an essentially commercial port. None the less the Russians have rendered it a second Sebastopol, and in 1886 withdrew its privileges as a free port. The harbour is one of the best on the east coast of the Black Sea. The place has been vastly improved since it changed hands, as to shops, hotels, schools, churches, and even its single mosque, but is still mean in appearance and insanitary in its condition. The marshy country around it has been drained. Pop. (1882) 8671, mostly Russians. Batoum was founded as Petra by one of Justinian's generals early in the 6th century A.D., and figures as Vati in the middle ages. Ruins of churches and other buildings are found in the neighbourhood.

Batrachia. See AMPHIBIA.

Batrachomyomach'ia ('the War of the Frogs and the Mice'), a Greek mock-heroic poem, erroneously ascribed to Homer, with whose works it has been generally printed. Píges of Caria, who lived in the times of the Persian wars, was named amongst the ancients as its author. It is a parody on the *Iliad*, in which the military preparations and contests of beasts, with single combats, intervention of the gods, and other Homeric circumstances, are described with much humour. A recent edition is Mitzschke's (Berl. 1874).

Batrachus. See FROG-FISH.

Batshian. See BARCHAN.

Batta, in the British army in India, is an allowance in addition to the ordinary pay of officers. The pay is fixed; but the batta varies according to the part of the country in which the troops are placed, and also depends on the circumstance of their being in the field or in cantonments. In the field, or more than 200 miles from the pre-idential government cities, the officers receive full batta; if in garrison, or in cantonment within that distance, half batta. The word is Indo-Portuguese, as old at least as 1548, and most likely originally derived from the Canarese *bhatta*, 'rice in the husk.'

Battalion, an infantry unit for both tactical and administrative purposes. The war strength of a British battalion is 1096 of all ranks, or 1000 bayonets. This is found to be the largest number of men that can be controlled in action by one commander, and has been adopted as the proper strength of a battalion in all European armies. Its front in two-deep line, or in modern attack formation, is 340 yards. A British battalion is divided into eight companies, each commanded by a captain, with two lieutenants under him; the companies are also grouped, for tactical purposes only, into two half-battalions (formerly called wings), each commanded by a major. The whole is under a lieutenant-colonel, who has, as regimental staff, an adjutant (captain or lieutenant), and a quartermaster (captain or lieutenant), who is always promoted from the ranks, a surgeon, and paymaster. The sergeant-major and bandmaster are warrant officers, but do not hold commissions. The other non-commissioned officers are 8 colour-sergeants (1 per company), 32 sergeants, 1 quarter-

master-sergeant, 1 sergeant-instructor of musketry, 1 orderly-room-sergeant, 1 paymaster-sergeant, 1 sergeant-drummer, 5 sergeant-piper (in Highland battalions), 1 armourer-sergeant, 1 sergeant-pioneer, 1 sergeant-cook, and 40 corporals. There are also drummers and handsmen. See BAND.

Every battalion takes into the field 3 small-arm ammunition carts, 1 water cart, and 8 general-service wagons for baggage, requiring 45 horses. When manœuvring, a group of two or more battalions forms a brigade of infantry. A battalion is made up to war-strength by calling up reserve men. For linked battalions, see the article ARMY (BRITISH).

Battas, or BATAKS, a remarkable race belonging to the Malay stem, inhabiting the part of Sumatra south of Atcheen. Originally spread over the whole northern half of the island, they are now shut in on all sides from the sea, but in the highlands of the interior they have hitherto maintained their individuality and independence. According to Junghuhn, their number is about 150,000. Although in form they show the usual Malay type, they are taller and stronger than the inhabitants of the coast. In colour they are light-brown, and have somewhat prominent features and long hair. They work at agriculture and cattle-rearing, and live together in villages, protected by thickets of bamboo stakes. The government is derived from the old Malay form, and is democratic in character. Each village has its rajah, but his influence is great only in times of war. The real government is through popular assemblies, which are often stormy scenes. Slavery is an established institution, the usual cause of the loss of liberty being debt. Polygamy is permitted, though it is rare to find more than two wives in one family. A very curious custom is the institution of cannibalism as a punishment for murderers, prisoners of war, adulterers, spies, and traitors. Though surrounded by Mohammedans for centuries, they have preserved their primitive religion. They revere the memory of their ancestors, and believe in an under-world of wicked spirits (*Begus*), who must be constantly appeased by offerings. Their supreme deity is Diebata, the maker of the world, who lives in the seventh heaven, but the government of the world is committed to the three gods, Batura Guru, Sri Padi, and Mangala Bului. These are not Malay but Indian names, and have descended from a time when Indian culture and writing, as well as Indian religious conceptions, influenced the Malay Archipelago. The Battas have reached a comparatively high stage of culture, and the arts of reading and writing are widely spread among them. They possess an alphabet apparently derived from the old Indian monumental characters, and a written literature, chiefly books on witchcraft, incantations, riddles, and stories. Their books (*Pustaha*) consist of bark or bamboo staves inscribed from bottom to top, the lines arranged from left to right. According to Junghuhn the language is nearest akin to the old Javanese and Tagal, but Schreiber attempts to establish a closer affinity with Malay proper. It has six distinct modes of speech, such as the *bata andang*, or language of funeral ceremonies, and the *bata pada*, or soothsayer's language.

Battel, WAGER OF. See BATTLE.

Batten, or LATHE, is the swing utensil of a loom, by which the weft or woof is struck home, and in which the shuttle runs. It is usually called the *lay* in Scotland. See WEAVING.

Battens, sawn fir timber, of smaller dimensions than the kind called planks. They are usually from 12 to 14 feet long, 7 inches broad, and 2½ inches thick. Cut into two boards, each 1½ inch thick, they are used for flooring; cut into three

nonia by the Magyars, in 884 A.D., and has given to Hungary many distinguished warriors, statesmen, and churchmen. The surname is derived from lands obtained in the 14th century.—Count Casimir Batthyanyi, a member of the principal branch of the family, was born 4th June 1807. He was Minister of Foreign Affairs in Hungary during the insurrection in 1849, in which he also distinguished himself as a military governor. After the catastrophe of Vilagos, he fled, along with Kossuth, into the Turkish territory, where he remained till 1851. He then went to France, and died at Paris, 13th July 1854.—Count Louis Batthyanyi, belonging to another branch of the same family, and born at Presburg in 1809, having espoused the national cause, yet seeking to maintain the connection with Austria and his allegiance to the Austrian sovereign, was appointed President of the Ministry, when Hungary obtained a ministry of its own, in March 1848. His ability was not equal to the goodness of his intentions, and the circumstances in which he was called to act were very difficult and embarrassing. He did not hold the office long, and afterwards took part in public affairs, chiefly as a member of the diet, and with great moderation. Yet, after the Austrians entered Pesth, he was arrested in January 1849, and on 6th October was executed by sentence of martial law. His condemnation was unexpected, and awakened the more sympathy, because all men regarded it as unjust. His estates, which were valued at £400,000, were confiscated, but were restored to his family in 1867; and in 1870 his body was removed, and interred anew, with great pomp and solemnity. —A Prince Batthyanyi (1803-83) occupied for forty-five years a prominent position on the turf, winning the Derby in 1876.

Battle, a town in Sussex, 6 miles NW. of Hastings. Encircled on three sides by wooded hills, it consists of one street, extending along a valley from NW. to SE. Till recent years Battle was noted for its manufacture of gunpowder, known as Battle powder. An uninhabited heathland then, Senlac by name, it received its present name from the Battle of Hastings (q.v.), fought here on 14th October 1066, when the Normans, led by William the Conqueror, overthrew the old English monarchy under King Harold. William, to commemorate his victory, founded in 1067, on the spot where Harold fell, a splendid Benedictine abbey, which was endowed with all the land within a league of it. The abbey had the privileges of a sanctuary, and the conqueror's sword and a roll of his barons were deposited in it. The so-called original roll is supposed to have perished in the burning of Cowdray House, near Midhurst, in 1793; and the ten copies of it extant have all been grossly tampered with. The existing buildings, Decorated and Perpendicular in style, occupy three sides of a quadrangle—two sides in ruins, the third converted at the Dissolution into a private dwelling-house. The abbey was bought in 1857 by Lord Harry Vane, afterward Duke of Cleveland. Pop. (1881) 3319. See J. B. Burke's *Roll of Battle Abbey Annotated* (1848), and Mackenzie Walcott's *History of Battle Abbey* (2d ed. 1867).

Battle (Fr. *batuville*, akin to *batte*, 'to beat'), a hostile encounter on land or sea, which will fall to be discussed under TACTICS and WAR. In 1851—the year that was to inaugurate a universal peace—Sir Edward Creasy published *The Fifteen Decisive Battles of the World*, a title from which the emphatic 'The' might have well been omitted. His list is as follows: Marathon (490 B.C.), Syracuse (413 B.C.), Arbela (331 B.C.), Metaurus (207 B.C.), defeat of Varus (9 A.D.), Châlons (451), Tours (732), Hastings (1066), Orleans (1429), defeat of

Spanish Armada (1588), Blenheim (1704), Pultowa (1709), Saratoga (1777), Valmy (1792), and Waterloo (1815). Actium (31 B.C.), Lepanto (1571), and Trafalgar (1805) might fairly have been included in the list, to which should now be added Königgrätz or Sadowa (1866), and Sedan (1870).

Battle, WAGER OF. The Wager of Battle, or as it is sometimes called, Trial by Combat, was an ancient usage in English law which permitted the accused and accuser, in defect of sufficient direct evidence, to challenge each other to mortal combat, for issue of the dispute. It obtained in civil and criminal cases, and also in military matters, to which, indeed, it was more appropriate. It consisted of a personal combat between the parties in presence of the court itself, and was grounded on the idea of an appeal to Providence, the expectation being that Heaven would give the victory to the innocent or injured party.

In charges of treason, the wager of battle was occasionally resorted to. 'It seemeth,' says Coke, 'that by the ancient common law one accuser or witness was not sufficient to convict any person of high treason; for in that case, where is but one accuser, it shall be tried before the constable or marshal by combat, as by many records appeareth.' The court over which the constable or marshal presided was called the Court of Chivalry. When the Earl-marshal sat alone, it was a military court, or court of honour; when the Lord High Constable and the court sat conjointly, it was also a criminal court. The form and manner of waging battle in cases of treason were very elaborate, and attended by imposing ceremonies. (A full account of these will be found in Blackstone's *Commentaries*, book iv.) In *Richard II.* (I. iii.), in the quarrel between Norfolk and Bolingbroke, Shakespeare has preserved a perpetual record of this chivalrous solemnity.

In civil cases, the battle was waged by champions, and not by the parties themselves; but in criminal cases, the parties fought in person, unless the appellant were a woman, a priest, an infant, or a man of the age of sixty, or lame, or blind, all of whom might refuse the wager of battle, and compel a trial by jury. Commoners could not challenge peers of the realm to wage battle, on account of their personal dignity, nor, by special charter, could the citizens of London engage in trial by combat, fighting being considered foreign to their education and employment. Whether by champions or in person, the mode of proceeding was the same. The appellee, or defendant, as he might be called, threw down his glove, and declared that he would prove his right, or defend himself with his body. The appellant, or prosecutor, in accepting the challenge, took up the glove, and replied that he was ready to make good his appeal, body for body; and thereupon the parties, holding each other's hands, joined issue before the court in a very formal and solemn manner. The combatants were obliged to swear that neither of them would resort to sorcery or witchcraft. The battle might last till the stars appeared in the evening, and the party who by that time had either killed or got the better of his opponent, was considered the successful suitor of justice. In a charge of murder, if the accused was slain, it was taken as proof of his guilt, and his blood was attainted; if he was so far vanquished as not to be able or willing to fight any longer, he was adjudged guilty, and sentenced to be hanged immediately.

So late as the year 1818, this barbarous procedure was solemnly decided by the Court of King's Bench to be a valid and legal mode of trial, which the king's subjects were free to adopt. Of course, the principle was, that all laws, no matter how

unsuitable to the times, could be enforced, unless expressly repealed by act of parliament. The case is that of *Ashford v. Thornton*, and is reported in the first volume of *Barnwall and Alderson's Reports*, p. 405. As we have stated, the court decided in favour of the validity of the ordeal, one of the judges remarking that sufficient had not been stated to induce their lordships to refuse the battle, and another more plainly and unequivocally observed that the defendant was 'entitled to this his lawful mode of trial.' But Lord Ellenborough put the matter more clearly by stating that 'the general law of the land is in favour of the wager of battle, and it is our duty to pronounce the law as it is, and not as we may wish it to be; whatever prejudices, therefore, may justly exist against this mode of trial, still, as it is the law of the land, the court must pronounce judgment for it.' In this case, the man at the bar was charged with murder; and he threw down the glove in token that he challenged his accuser. The latter individual, however, declined, under legal advice, to take up the glove, and so the charge was departed from. In consequence of this case, the Act 59 Geo. III. chap. 46 was passed, by which the ordeal was wholly abolished.

In Scotland, the matter would have been differently disposed of; for the judges there, following the doctrine of the Roman law, would have held the proceeding to have been in desuetude and obsolete, and there the matter would have ended.

Montesquieu, in his *Spirit of Laws*, book xxviii., very ingeniously and plausibly deduces the modern practice of duelling and the so called laws of honour from the above form of judicial combat. See ORDEAL.

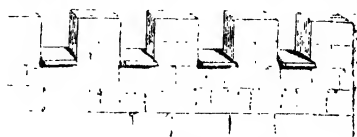
Battle-axe was a weapon much used by the early northern nations, Celtic and Scandinavian, requiring great strength in its use. Some were held with one hand, some with two; the former kind could be wielded equally by horse and foot, but the latter was for foot-soldiers only. The battle-axe had a longer handle, and a broader, stronger, and sharper blade than the common axe. During the middle ages, and somewhat earlier, it was much used in sorties, and to prevent the escalading of a besieged fortress. The *pole-axe* differed but little from the battle-axe. The *black bill* and *brown bill* resembled a halbert, having the cutting part hooked like a woodman's bill, with a spike projecting from the back, and another from the head. *Glaives*, usually a sword, was sometimes applied to a kind of pole-axe or bill used by the Welsh. See HALBERT, LOCHABER AXE.

Battle Creek, a thriving town of Michigan, on the Kalamazoo River, and at the junction of several railways, 45 miles SW. of Lansing. It has flour-mills, iron-foundries, machine shops, and several manufactories. Pop. (1880) 7063; (1890) 13,197.

Battleford, in Saskatchewan, North-west Territories of Canada, at the junction of the Battle River with the Saskatchewan, and a little to the north of the route of the Canadian Pacific Railway. The North-west Territories were organized as a part of the Dominion in 1870, and Battleford was the seat of government from October 1876 to March 1883, when the capital was transferred to Regina (q.v.). The country near is rolling prairie, thickly grassed, without tree or scrub.

Battlement (Fr. *bâtiement*, 'building'), a notched or indented parapet formed by a series of rising parts called *cops* or *merlons*, separated by embrasures or openings called *crenelles*. Battlements were intended to enable the soldier to shelter himself behind the merlon, whilst he shot

through the embrasure. Originally military, it became freely used for architectural effect in



Simple form of Battlement.

buildings. In churches, the battlements are frequently pierced with circles or trefoils.

Battue (from Fr. *battre*, 'to beat'), a less used by real sportsmen than by writer sport. The *battue* is a method of killing game on a great scale, by causing animals to be driven forward to a point where a number of guns are posted. The driving is effected by beating bushes; hence the term *battue*. The phrase 'grand battue,' occurs in the *Gentleman's Magazine* for 1816; but, according to Colnden, the *battue* was unknown in 1790. Certainly, as it is practised to day, it is quite modern; though a plan of killing deer by driving them forward in front of an ever-narrowing circle to a place where they are to be shot is an old usage in the Highlands where it is called the *linch* (Gael. *linch* 'circuit'). Some people regard the *battue* as but a mean and butcherly amusement, but Henry Stevenson, author of the *Birds of N. H.*, in defence of the heavy shooting common in Norfolk and Suffolk, says there is certainly much bodily fatigue, but the sportsman is always on the alert; there is every opportunity for good and bad shooting, and he is no credit shot who can account for one in every three or four empty cartridges. It is practised chiefly in the extensive preserves of pheasants and hares during autumn and winter months, when country gentlemen invite acquaintances to their houses for the sake of field-sports. The *battue* takes place in the day; the number of men is usually six or ten, each provided with at least two guns, which are loaded by an assistant as soon as they are discharged. When the guns are set at safe distances from each other, and ready to commence work, the beaters begin to drive the game before them. Sometimes, however, pheasants will run a long way before they get to the wing, and to make them rise on the wing the guns, a low net is occasionally stretched across their path. It should be stated, however, that in the *battue*, hares, rabbits, &c. are shot as well as pheasants; and at length the ground is covered with slain, like a field of battle. Big game was first introduced into England from 1860, the first to startle the shooting in this respect being the Maharajah of Singh, then of Elveden Hall, Suffolk. A single pheasant in a single day, or even 2000, is not unusual; the annual total for the United Kingdom has been estimated at 335,000. One of the large bags on record was made at Bradgate, the seat of Lord Stamford, Leicestershire, when 14 guns in four days killed 8900 game. At Croxeth, in 1883, a week's shooting resulted in 7691 head of game. Such a cheap game, as in November 1885 cock pheasants could be bought at 2s. apiece in London under many circumstances they might have been a brace. The profits derived from this stock amounts on some estates to no inconsiderable sum annually. For an account of shooting, we refer to *Shooting*, by Lord Ham and Sir Ralph Payne-Gallwey (2 vols.).

Batum. See BATUM.

Baturin, a town of South-western Russia, in government of Tchernigov, on the Seim, 50 miles SSW. of Novgorod. Pop. 6850.

Batuta. See IBN BATUTA.

Baucis. See PHILEMON.

Baudelaire, CHARLES, was born at Paris on 21st April 1821. In his youth he travelled to Asia, and is said to have likewise visited the Mauritius and Madagascar. On his return to Paris he became a notable figure in the second up of Romantic poets who carried on the movement begun by the Romantics of 1830. His *Œuvres du Mal*, a volume of poems issued in 1857, was the subject of a prosecution on the score of morality, and had to undergo expurgation. He afterwards published *Les Paradis artificiels*, *Opium*, *Laschich*, a work partly original, partly composed of selections, admirably translated, from the writings of Poe and De Quincey. His occasional essays, which were finally collected in a volume entitled *Œuvres romantiques*, are remarkable for the finish of style and the subtlety of the criticism. Apart from his verse, however, Baudelaire's finest work is contained in his fifty *Petits Poèmes en Prose*, of these are exquisitely written, and in many of the beauty of the thought is equal to the clarity of the language. Baudelaire died in Paris on August 1867. He was neither a prolific nor a clear writer, and he too often misapplied his fine intellect to repulsive subjects. He united remarkably keen analytic faculty with a powerful, sombre imagination. Brooding melancholy, only tinged with irony, inspires the solemn and dreamlike imagery of his best verses. A writer whom, in many respects, he resembles is Edgar Allan Poe. See Gautier's essay prefixed to the collected edition of Baudelaire's works (5 vols. Paris, 1872), and E. Crepet's *Œuvres posthumes et Correspondances intimes de Baudelaire* (Paris, 1887).

Baudry, PAUL, a French painter, was born on 14 November 1828, at La Roche-sur-Yon, and died in Paris and Rome. Among his best known works are 'Punishment of a Vestal Virgin' (1857) and the 'Assassination of Marat' (1867). He was for ten years employed in decorating the *scenar* of the Grand Opera in Paris. Elected a member of the Académie des Beaux-Arts in 1870, he died 17th January 1886. See *Magazine of Art* for September 1886.

Bauer, BRUNO, one of the most audacious of recent biblical critics, was born at Eisenberg, in the duchy of Saxe-Altenburg, 9th September 1809. After his studies at Berlin, he became a *privat-docent* in the university there, and in 1839 at Bonn; at three years later he was forbidden to deliver any more theological lectures. He then removed to Berlin, and busied himself there with incessant writing of a more or less violent and polemical description on theological and political subjects, until his death at Kisdorf, near Berlin, 13th April 1882. At first an adherent of the young Hegelian school, Bauer in his earlier works explained the Christian religion as substantial truth obscured by the accretions of a confused and erroneous system of interpretation. In his books on John and the Apocryphic Gospels, published in 1840-42, he maintained that the gospels were in no sense historical, but merely artistic products of the human self-consciousness. These books brought him into bitter controversies, which impelled him to write often both violent and vulgar. He was against the emancipation of the Jews, and from this time he abandoned his earlier views, and employed himself in writing *Die Juden*. He wrote

numerous historical works on the 18th century, in which he tries to show that the failure of the popular and national struggles in the 19th century was a result of the essential weakness of the 'enlightenment' of the 18th. Later he returned to his earlier studies, and alternated books of destructive criticism on the gospels, the Acts of the Apostles, and the Pauline epistles, with defenses of Prussian conservatism. His latest work, published in the year of his death, was *Disraeli, romantischer und Bismarcks sozialistischer Imperialismus*.

Bauer, CAROLINE, a German actress, born at Heidelberg in 1807, made her debut in 1822, and had achieved a brilliant success, in comedy and tragedy alike, when in 1829 she married Prince Leopold, afterwards king of the Belgians. Theirmorganatic union was as brief as it was unhappy; in 1831 she returned to the stage, which she quitted only in 1844, on her marriage to a Polish count. She died at Zürich, 18th October 1878. Her Posthumous Memoirs (Eng. trans. 1884), with their denunciations of Prince Leopold and from Stockholm, offer a striking contrast to the two bright volumes of theatrical reminiscences which had preceded them in 1871 and 1875.

Bauhinia, a genus of Leguminosae, suborder Caealpinee. The leaves are generally divided into two lobes, which led Plummer to name this genus in memory of the united labours of the brothers John and Caspar Bauhin, two botanists of the early part of the 17th century. The species are natives of the warmer regions of both hemispheres, and some of them are remarkable for the size and beauty of their flowers. Most of them are twining plants; or *lianas*, stretching from tree to tree in the tropical forests, such as *B. rubra*, the Maloo Climber of India, which may attain a length of 300 feet, at once smothering the highest tree-tops and strangling the stems below; but some are small trees, as *B. pterocarpa*, the Mountain Ebony of Jamaica, so called from the colour of its wood. The inner bark of several East Indian species is employed for making ropes; that of the Maloo Climber being employed for making suspension bridges on account of its extreme toughness. *B. robusta* and *B. emarginata*, also East Indian, exude a brownish coloured mild gum; whilst the astringent bark of *B. variegata* is used in Malabar for tanning and dyeing leather, and also in medicine; it also yields an ebony. The leaves of various species are used in Brazil as demulcent medicines, having anubigamous properties. Livingstone mentions a species of bauhinia in South Africa, called the Morang Tree. It is remarkable for the little shape which its leaves afford. They fold together, and are nearly erect during the heat of the day, and the larva of a species of *Psylla* cause a secretion, in circular patches, beneath the pupa of the insect is found. The natives pick off, and eat it as a dainty.

Baumgarten, ALEXANDER, GOTTFRIED, an acute thinker of the school of Wolff, at Berlin on the 17th of July 1714, studied at Halle, and in 1740 became professor of Philosophy at Frankfurt-on-the-Oder, where he died 26th of May 1762. He is the founder of the (q.v.) as a systematic science of the mind, and an integral part of philosophy. He issued two volumes of his *Esthetica*, but hindered the completion of the work. He is in other departments of philosophy are clearness and precision. He carried the rationalistic system of Wolff to its utmost limit; his *Metaphysica* (Halle, 1739) is one of the most useful books for the study of the Wolfian philosophy.

sophia Generalis (published 1770), *Ethica* (1740), *Jus Nature* (1765). See Joh. Schmidt's *Leibnitz und Baumgarten* (Halle, 1874).

Baumgarten-Crusius, LUDWIG FRIEDRICH OTTO, a German theologian, born at Merseburg, 1788. He studied theology at Leipzig, became in 1810 university preacher there, and in 1817 professor of Theology at Jena, where he died, May 31, 1843. As a theologian, he showed a semi-rationalistic tendency, from which, however, he was saved by a yet more powerful influence—a spiritual affinity with Schleiermacher. His best work is in the region of the history of dogma. His chief works are *Lehrbuch der Christlichen Sittenlehre* (1827), *Lehrbuch der Christlichen Dogmengeschichte* (2 vols. 1831-32), *Kompendium der Christlichen Dogmengeschichte* (2 vols. 1840-46), the last—completed from his notes by Hase—perhaps his best book.

Baur, FERDINAND CHRISTIAN, was one of the most eminent and influential of modern German theologians. It has not unjustly been said of him that he was for the criticism of the New Testament what Wolf and Niebuhr were for classical literature and history. Baur was born at Schmiden, near Stuttgart, on the 21st June 1792, became professor in the theological seminary at Blaubeuren in 1817, and was called to the university of Tübingen as professor of Theology in 1826. In his work here he spent a most laborious life, being known as the founder of the 'Tübingen School'; and at Tübingen he died 2d December 1860.

His first publication, *Symbolik und Mythologie* (1825), expounded the nature-religion of antiquity; but the main work of his life lay in the fields of church history, the history of Christian dogma, and biblical criticism. Originally a disciple of Schleiermacher, he early attached himself to the school of Hegel, and the Hegelian conception of history he in the main continued to hold from the time he published his books on Manichæism (1831) and Gnosticism (1835) till the end of his life. Of much greater importance than these were his elaborate works on *The Christian Doctrine of the Atonement* (1838) and the *Trinity and Incarnation* (1843). The *Handbook of the History of Christian Dogma* was followed by three volumes of *Lectures on the same subject*. His famous *Contrast between Catholicism and Protestantism* (1836) was written in reply to the *Symbolik* of the Catholic theologian, Mohler.

Baur's article on the 'Christ-party in the Corinthian Church,' contributed to the *Tübinger Zeitschrift* for 1831, may be said to have first indicated that conception of the early Christian Church with which his name is identified, and which in a long series of works he has compelled all subsequent writers on this period either to accept in whole or in part, or explicitly to refute. The current view of the early church was that in it peace, concord, and unity prevailed. But from a careful study of the New Testament and patristic literature, Baur came to a different conclusion. The most ancient Christianity, it seemed to him, stood very near to Judaism, the Christianity of the congregation in Jerusalem and the apostles there. Paul was the first to free the new faith from this Jewishness, but the majority of the Jewish Christians, and the apostles were unable to adopt Paul's view of the scope and mission of Christianity, and opposed it at times with passionate intensity. The Judaistic or Ebionite party long maintained the supremacy in the church, their offering to Judaism mainly in the belief that Jesus was the Messiah, and it was not till after Paul's death, and mainly during the controversies about or after the middle of the 2d century, that the opposing parties were

welded together into the Catholic Church of the dogmatic system of the fourth century, the episcopal constitution of the 5th, the various stages of the process of Baur's belief, marked by extant documents amongst the books of the New Testament and extra-canonical literature. Most of the important books Baur held to have been written in the 2d century. Of Paul's epistles he regarded as genuine only those to the Romans (I. and II.), and Galatians; and only the epistles of Paul, and the Apocalypses, the opposite or Judaistic extreme, to have been written before the year 70. The Acts of the Apostles minimised the extent of the early church, and the high point of the conciliating tendency was the Council of Nice, which was of course not by the apostles, but by the writer of the 2d century. These views were opposed with vast learning, ingenuity, and criticism in *Paul, the Apostle of Jesus* (1867; Eng. trans. 1873-75); *Criticism on the Canonical Gospels*; the *Gospel of Matthew*; *Christianity and the Christian Church* (1863); *Three Centuries* (3d ed. 1863; Eng. trans. 1873). The later periods of church history he treated in four separate works: on the church from the end of the 6th century; the church of the middle ages; the church of modern times; the church of the 19th century. The principal organ being the *Theologische Zeitschrift* (published from 1842 to 1857), his disciples were very numerous, and the school was marked on many who could not be said to belong to the school. Many of the leading theologians of Baur and his earlier followers have been identified by the later representatives of the school as a whole, it is true, that its leaders were the first to turn to the doctrine, constitution, and the early church the strict science adopted by dispassionate workers in the field of historical research. It should be said that Baur's main position was too much anticipated by Semler, and also by Schleiermacher, Thomas Morgan and John T. Morgan (1859); and R. Mackay's *Tübingen School*, see Baur's own work, *Die Theologische Zeitschrift* (1859); and R. Mackay's *Tübingen School*. On Baur himself, see Zeller's *Portraits of German Theologians* (2d ed. 1875).

Baintain, LOUIS EUGENE MAURICE, a philosopher and theologian, born at Baintain, 1796. A pupil of Cousin, he was professor of Philosophy in the Collège de France. He took orders in 1828, but was harassed by charges of heterodoxy in his writings, and at one time was removed from his sacred function for some time. He was appointed vicar-general of Paris, and in 1853 a professor of Philosophy in the Faculty. He died at Paris 18th October 1860. Besides being a very popular preacher, he wrote several philosophical books, among them *Logique Expérimentale* (1839), *Philosophie* (1842), *La Religion et la Liberté* (1843), *Le Paganisme* (1855), and *Philosophie* (1860).

Bautzen (Wendish *Badissun*), a manufacturing town in Saxony, situated on a high ground overlooking the river Spree, 10 miles from Görlitz by rail. It is the chief town of the administrative district of the same name, and had a population (1885) of 356,383, including the suburbs. It is one of the old Slavonic strongholds of the old Slavonic

Germany. The chief buildings are a cathedral (1497), and the castle of Ortenburg from 958, and a frequent residence of the Kings of Bohemia. The leading industries are manufactures of woollens, fustian, linen, leather, and gunpowder. Pop. (1871) 19,095. Bantzen was first made under Otto I. It suffered greatly in the Hussite wars, and still more during the Thirty Years' War. Here Napoleon, after an unsuccessful resistance, won a barren victory over the allied Russians and Prussians, May 1809.

Bavaria (Ger. *Bayern*), one of the states of the German empire; according to its size, the most important. Bavaria is divided into two parts, which are separated by the Balaun and the Danube. The northern part, which comprises fully eleven-twelfths of the whole, is bounded on the north by the Prussian, Bohemian, Austrian, and the Tyrol. The southern part is divided into eight districts, as follows:

	Area in sq. miles.	Pop. in 1885.
Upper Bavaria	6,455	1,004,716
Lower Bavaria	1,133	660,616
Palatinate	2,288	696,216
Swabia	3,845	537,553
Franconia	2,702	576,028
Upper Franconia	2,222	671,536
Lower Franconia	3,243	619,805
Upper Palatinate	3,787	649,150
Total	29,975	5,416,180

The population is a little less than that of Scotland. In 1885 the population was 5,589,932; Munich, the capital, had 348,317 inhabitants, and Nuremberg 110,000.

Hydrography, Railways, &c.—Bavaria is bounded on the SE., NE., and NW. by the Rhine, ranging from 3000 feet to close on 6,000 feet in height. The highest elevation is on the south, the Zugspitz of the Alps being 9665 feet high. The interior is intersected in several directions by various less elevated ranges, alternating with extensive plains and fertile valleys. The country is rich in wood, only one-third of its surface being covered with its mostly of pine and fir.

The river Rhine flows along the whole eastern boundary of the Palatinate, which is also watered by the Speyer, the Lahn, and the Queich. The Danube enters Bavaria proper at Ulm, and pursues its course through the centre of the country until it passes out at Passau into the Austrian dominions. Including its windings, the length of the Danube in Bavaria is about 279 miles, which can be navigated throughout. The north part of the state is in the basin of the Main. The lakes and rivers abound in fish. The *Ludwigs-Kanal* connects the Rhine and Danube, and through them to the German Ocean with the Black Sea. Bavaria has altogether about 3200 miles of railway in operation, about 9000 miles of public roads, and 5300 of telegraphs.

Climate, Soil, Products, &c.—The temperature of Bavaria varies considerably, but the climate may be described generally as mild and salubrious. The soil is very fertile, and the wealth of the country rests almost wholly of its agricultural produce. The plain south of Munich has been described as the granary of Germany, while the districts of Upper and Middle Franconia are styled the hop-garden of Bavaria. The vine is cultivated extensively in the south, and the wine is held in great esteem. Bavaria also produces good wine. The annual produce in Bavaria is estimated at 16,000,000 gallons. Cattle-rearing is the exclusive occupation of the inhabitants of the slopes and at the foot of the Alps. The

forests of Bavaria annually furnish large quantities of timber. The chief minerals are salt, which is a government monopoly, coal, and iron, which is worked almost everywhere throughout the territory.

Manufactures, &c. The manufacture of beer is carried to great perfection in Bavaria, and to an extent unparalleled in Europe. There are upwards of 5400 breweries in Bavaria, making about 110 million gallons of beer annually, which are mainly consumed in the country. Nearly two-thirds of the revenue of the state is said to be derived from this source alone. Next to beer, coarse linens and woollens are the most important products. Glass is pretty extensively manufactured, as also are iron goods, firearms, toys, paper, articles of straw and wood, porcelain, nails, needles, jewellery, chemicals, beetroot sugar, and tobacco. The mathematical, optical, and musical instruments of Munich are held in high repute. The position of Bavaria gives it a large share of the transit-trade between North Germany and Austria, Switzerland, and Italy.

Population.—The growth of the population of Bavaria has been much checked by the regulations which relate to marriages. No marriage can take place until the public authorities have given permission: in especial, until the guardians of the poor are satisfied that the persons wishing to marry have adequate means to support a wife and family. (Bavaria and Alsace-Lorraine are specially excepted from the law of 1868, valid elsewhere in Germany, which removed these restrictions.) These restrictive laws have naturally tended to increase inordinately the number of illegitimate children. Bavaria has a bad pre-eminence in this respect on the Continent. In the capital, the illegitimate births have at times almost equalled the legitimate. In 1859 the illegitimate births were 23.6 per cent of the whole; in 1884, 13.87 per cent. (the percentage being least in the Palatinate). In 1817 the population was 3,564,757; in 1833, 4,187,390; and in 1855 it had only increased to 4,541,556. During recent years, however, the increase has been more rapid. The Bavarians, notwithstanding their beer-bibbling propensity, are essentially a sober and industrious people. In Franconia, the people are mainly descended from the Frankish stock, in Swabia from the Allemannian; while the old Bavarian stock is represented in the districts of Upper and Lower Bavaria, and in the Upper Palatinate.

Religion. In 1880 the Roman Catholics numbered 3,748,032; Protestants, 1,177,312; Jews, 53,526; and other minor sects, 5908. The state allows perfect toleration, guaranteeing the same civil rights to Catholic and Protestant alike. A concordat with Rome divides the state into 2 archbishoprics and 6 bishoprics. The revenues of the Catholic Church are derived from lands and endowments; the Protestant Church is supported by the state.

Bavaria has a good system of education, under the supreme direction of a minister of public instruction. Besides elementary schools, there are about 30 *gymnasiums*, and numerous technical schools of various kinds. The three Bavarian universities are at Munich, Wurzburg, and Erlangen, the last being Protestant. There are several extensive libraries in Bavaria, that of Munich being one of the largest in Germany. Art has been zealously cultivated in Bavaria, and since the days of King Louis I has been peculiarly fostered by the state. There are numerous institutions for the furtherance of painting, sculpture, and music.

Government, Revenue, &c. Bavaria is a constitutional monarchy, the throne hereditary in the male line. Its constitution dates no further back than

1818, when it was declared a part of confederated Germany. When Bavaria in 1870 became one of the states of the German empire, she still retained certain independent privileges, including the control of her home affairs, of her postal system, and of her army in time of peace. The king is the executive, but his ministers are responsible for all his acts. The legislature consists of a chamber of senators and one of deputies. The senators are hereditary; the king, however, having the power, within certain limits, to nominate life-members. The Chamber of Deputies consists of representatives in the proportion of 1 deputy to every 31,500 of the population.

The *revenue* of Bavaria for 1886-87 amounted to 241,491,646 marks (almost £12,000,000), and the expenditure for the year was estimated at the same figure. The public debt in 1886 was 1,344,658,766 marks (£62,982,309), about two thirds of it having been contracted for railways.

The *army* system was in 1871 remodelled on Prussian lines. The army in 1870 was formed into two corps of the imperial army, each consisting of two divisions, under the command of the king of Bavaria in times of peace, but controlled by the emperor of Germany in war. On the peace-footing, it consists of 52,863 men, without including the *Landwehr*. In time of war this force is rather more than trebled.

History.—The Boii, a race of Celtic origin, appear to have conquered the country about 600 B.C., and they retained it until shortly before the Christian era, when they were subjugated by the Romans. After the decay of the Roman power, the Ostrogoths and Franks successively held possession of it, and it was a part of Charlemagne's empire. In 1180 it was transferred by imperial grant to Otto, Count of Wittelsbach, whose descendant now occupies the throne. The Rhenish Palatinate was conferred on this family by the Emperor Frederick III. in 1216. Now followed quarrels between relatives, and divisions of territory, until the dukedom of Bavaria was severed from the Rhenish and Upper Palatinates (see PALATINATE); of the latter, however, it repossessed itself in 1621, the peace of Westphalia, in 1648, confirming the title of its princes to that possession, as well as its right to the electoral dignity, to which it had been raised in 1624. In the War of the Spanish Succession Bavaria supported France, and suffered considerably in consequence; but in 1777, on the extinction of the younger Wittelsbach line, it received the accession of the Rhenish Palatinate. In 1805 Bavaria was erected into a kingdom by Napoleon I. The king assisted Napoleon in his wars, and in consideration of his aid received large additions of territory. In 1813, however, the Bavarian king contrived to change sides opportunely, and thus managed to have confirmed to him, by the treaties of 1814-15, an extent of territory nearly as valuable as the possessions which the treaties of Presburg and Vienna had given him, and which he had now to restore to Austria. In 1818 a new constitution was granted.

In 1825 Louis I. ascended the throne. He was a well-meaning, liberal, and intellectual monarch; but he lavished the wealth of the kingdom to an extravagant degree on the embellishment of the capital, and on works of art, while neglecting works of practical value. The restriction of the freedom of the press, following the French revolution of 1830, excited so much opposition that it was soon after rescinded; but fresh dissatisfaction was created by the imposition of new taxes. The Jesuits now obtained an immense influence with the king, which they used to the detriment of popular rights. The wrath of the people was further aroused against their monarch by his connection with the

notorious Lola Montez (q.v.), who for a time wielded great influence in the state. In May 1848, following the example set by the French revolutionists, the people of Munich seized the king and demanded reforms and the expulsion of Lola Montez. The king had to consent; but the same month he abdicated. His son, Maximilian II., ascended the throne. He died in 1864, and was succeeded by his son, Louis II. In the war between Austria and Prussia in 1866, Bavaria took the Austrian side, and after the short campaign had to pay Prussia 30 million florins (£3,000,000) and to cede some small strips of territory. Louis also made a defensive and offensive alliance with Prussia; and in the struggle which followed between the party which aimed at the independence of Bavaria and the party which aimed at closer and friendlier relations with Prussia and the Ultramontane or 'Patriot' party, the former had on the whole the better of it. Munich was the main centre of the Old (q.v.) movement. On the outbreak of the Franco-German war in 1870, Bavaria put her troops under the command of the Prussian King, and the Bavarian troops took a distinguished part in the battles of Weissenburg, Worth, before Paris, and on the Loire. In November 1871 the government agreed, on the granting of certain concessions, to become part of the German Empire, and a month later it was the king of Bavaria who, at Versailles, proposed that the imperial crown should be conferred on the Prussian king. Since then the struggle between liberals and Ultramontanes has proceeded with varying success. King Louis carried his grandfather's love of music to excess; he finally went mad, and committed suicide by drowning, June 13, 1906. It should be remembered less for his artistic extravagances than for his generous patronage of the great composer Wagner. He was succeeded by his brother, Otto (also unhappily insane), under the regency of his uncle, Prince Luitpold.

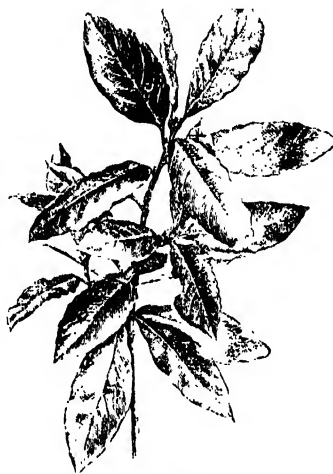
Baxter, Richard, one of the most eminent of the Nonconformist divines, was born November 7, 1615, at Rowton, Shropshire. His father, Richard Baxter, of Eaton Constantine, Shropshire, was a man of some means, but had squandered his property in gambling, so for the first ten years of his life Baxter lived with his grandfather. His education was irregular and imperfect, but he acquired immense stores of varied knowledge by private study. When eight or nine years of age, he was persuaded to make trial of a court life, and the most likely way to rise in the world, and he was introduced to the Master of the Revels at Whitehall; but the experiment was eminently unsuccessful, and at the end of a month he returned home, 'glad to be gone,' he says. From his early days he was under religious impressions, which deepened as he grew older, and led to his entering the ministry, though in very delicate health when he was about twenty-three years of age. He was ordained by the Bishop of Worcester, and entered on the mastership of Dindley grammar school, preaching occasionally. After a year he went as assistant to a clergyman in Bridport, where he laboured for nearly two years. Originally, like his family and friends, an unembarrassed conformist, he about this time found himself drawn by study of the controversial points to some of the nonconformist views. In 1646 he was invited to officiate for the year at the parish church of Worcester, where he remained for other years. When the civil war broke out in 1642, he, following his political views at variance with the policy of the king of Worcestershire, and some disorders in the city, he retired to Coventry, where he ministered for two years to the garrison and inhabitants, whose sympathies were almost wholly with the

After the victory of Naseby he acted as chaplain of the regiments, and was present at the battle of Bridgewater, Bristol, Exeter, and Worcester. Whilst with the army, he employed all his influence to moderate the extreme views, political, religious, of the soldiers, and with considerable success. His health continuing very uncertain, he was led from the army to the house of his friend, Thomas Rouse, of Rouse-Lench, Worcester; and here, 'in continual expectation of death, one foot in the grave,' he wrote the first part of the best of all his works, *The Saints Everlasting Rest*, published in 1650. On the invitation of his former parishioners, he returned to Kidderminster, in spite of continued bad health, laboured for fourteen years with eminent success. 'When I came,' he says, 'there was about one hundred in a street that worshipped God, and when I was away there were some streets where there was not one poor family that did not do so.' At the Restoration, Baxter was appointed one of the divines, and took a leading part in the Assembly of Divines. Presbyterian though he was, he did not object to a modified form of Episcopacy, yet he declined the proffered bishopric of Hereford. Shortly afterwards, in 1662, the Act of Uniformity having driven him out of the English Church, he was compelled to leave Kidderminster, and was subjected to much hardship and persecution. Retiring to Acton, in Middlesex, in 1663, he spent the greater part of nine years chiefly in the composition of some of the most important of his works. The Act of Indulgence in 1672 permitted him to return to London, where he divided his time between preaching and writing. But in 1675, after the accession of James II., he was charged, for alleged sedition in his Paraphrase of the New Testament, before Judge Jeffreys, who condemned him in the most brutal manner, calling him a seditious man, and swearing it would be no more than to whip such a villain through the city. Fined to pay 500 marks, and to be imprisoned in the Fleet, he lay in King's Bench for nearly eighteen months, and was released only on the mediation of Lord Powis. The latter part of his life was spent in tranquillity. He died on the 28th December 1691, in the seventy-fifth year of his age.

Baxter was a large-hearted man, and though a controversialist, had greater tolerance for the views of those who were opposed to him than was common in those days. He was one of the ablest and most eloquent preachers of his time, and a voluminous writer. His style is direct and vigorous, 'there is a vigorous pulse in his writings which keeps the reader awake and attentive,' and in his practical works he is intensely earnest. Of his works, *The Saints Everlasting Rest* (1650), *Non-Resistancy* (1663), *Call to the Unconverted* (1657), and *Reformed Pastor* (1656) are the best known. His theological works, such as *Methodus Theologica*, *Theologia*, and controversial works, are profound and important, but are for the learned only. His theological catholicity and tolerance led some to regard him as an Arminian, while by others he was held to be a Calvinist. It was said of him by Dr Isaac Barrow, with pardonable exaggeration, that his practical writings were never refuted, and his controversial seldom confuted. His poems he has left are of considerable value. The chief authority for his life is the *Life of Baxter*, published in 1696 as *Reliquiae Baxterianae*. A new edition of his works in 25 vols., with a new introduction, was published in 1843. His practical works occupy four large octavo volumes; his shorter lives are those by Dean Boyle (1883) and Davies (1886).

Bay is properly applied to an indentation of the sea into the land, with an opening wider than the depth. A gulf is understood to be deeper than a bay, and has often a narrow opening. These terms are often loosely applied; Baffin Bay, e.g., is really a gulf. When the body of water is large, and the entrance narrow, it becomes a shut sea, as the Baltic, the Red Sea, &c. Hudson Bay, the Persian Gulf, and the Gulf of Mexico, might with propriety be termed seas.

Bay, a name given to a number of trees and shrubs more or less resembling the Laurel or Victor's Laurel (*Laurus nobilis*), which is also called Sweet Bay (see LAUREL); the name *Bay* (Fr. *baie*, from Lat. *bacca*, 'berries'), which was once exclusively applied to the fruit, having been extended to the whole plant. The larger leaved hardy evergreen common in shrubberies, the Common Laurel or Cherry Laurel (*Prunus laurocerasus*), is sometimes called Bay Laurel. The true bay-leaves are frequently used for flavouring puddings,



Sweet Bay (*Laurus nobilis*).

&c.; but those of the laurel are sometimes substituted. The tannic or prussic acid given off by the latter when bruised are used by entomologists in killing butterflies and moths. Bay-rum, used by perfumers, is an aromatic liquid obtained by distilling rum in which bay-leaves have been steeped. The RED BAY of the Southern States of America is *Laurus Carolinaensis* (see LAUREL). The WHITE BAY of America is *Magnolia glauca* (see MAGNOLIA), and the LOBELLOID BAY of the same country is *Gordonia Lasiantha*. See GORDONIA.

Bay leaves with other evergreens decked houses at Christmas, were used at weddings, and were worn against thunder. The withering of bay trees was reckoned a prognostic of evil. This is alluded to in Shakespeare's *Richard II.* (II. iv.), who is here quoting from Holinshed. The following passage occurs in Parkinson's *Garden of Flowers* (1629): 'The bay-leaves are of as necessary use as any other in the garden or orchard, for they serve both for pleasure and profit, both for ornament and for use, both for honest civil uses and for physic, yea, both for the sick and for the sound, both for the living and the dead; . . . so that from the cradle to the grave we have still use of it, we have still need of it.'

Baya (*Platanus maculatus*, *P. baya*, or *Loxica philippina*, Linn.), the common Indian and Ceylon

Weaver-bird, so called in reference to its beautifully woven hanging nest. In spite of the title *philippina*, there is not any authentic example of a Philippine species. See WEAVER BIRD.

Bayaderes. See DANCING; NATCH GIRLS.

Bayamo, or SAN SALVADOR, a town in the interior of the eastern part of the island of Cuba, situated in a fertile and healthy district on the northern slope of the Sierra Maestra. It is connected by a railway with Manzanilla. Pop. about 7500.

Bayana, or BIANA, a town of India, in the Rajput state of Bhurtpur, 50 miles SW. of Agra. It was once a place of much greater importance than it now is, and was one of the most famous forts in India. The town contains many temples, and the whole ridge of the hill is covered with the remains of large buildings. Pop. (1881) 8758.

Bayard. PIERRE DU TERRAIL, CHEVALIER DE, 'the knight without fear and without reproach,' was born in 1476, at the Chateau Bayard, near Grenoble. He was perhaps the only hero of the middle ages who deserved the unmingled praise and admiration bestowed upon him—simple, modest, a sterling friend and tender lover, pious, humane, and magnanimous. After acting as page to the Duke of Savoy, he entered the service of Charles VIII., whom he accompanied to Italy in 1495. He won his spurs at the battle of Fornovo, where he captured a standard from the enemy. Early in the reign of Louis XII., in a battle near Milan, Bayard followed the defeated and retreating forces with such impetuosity that he entered the city with them, and was made a prisoner, but the Duke Ludovico Sforza released him without ransom. At Barletta, in 1502, Bayard and ten other French knights fought a tournament with an equal number of Spaniards, in order to decide their respective claims to superiority; and although seven French men were overthrown in the first charge, the result, chiefly through Bayard's bravery, after a six hours' combat, was declared equal. Next we find him fighting bravely in Spain, and against the Genoese and Venetians. When Pope Julius II. declared war with France, Bayard hastened to support the Duke of Ferrara; but failed in his scheme for making the pope a prisoner. Subsequently, he won fresh laurels in Spain. In the war with Henry VIII. of England, who with the Emperor Maximilian had threatened Picardy, and besieged Therouenne, in 1513, when the French, on one occasion, were about to lay down their arms, Bayard made a sudden attack on an English officer, and, pointing his sword at his breast, said: 'Yield or die.' The Englishman gave his sword to Bayard, who in exchange gave his own, saying: 'I am Bayard, your prisoner; and you are mine.' The emperor and the king of England exchanged their prisoners without any demand of ransom for Bayard. In 1515, when Francis I. ascended the throne, Bayard was sent into Dauphiné to make a way for the army over the Alps and through Piedmont. In this expedition he made Prosper Colonna a prisoner. Next, at Marignano, he gained a victory for the king, who, in consequence, submitted to receive the honour of knighthood from Bayard. When Charles V. broke into Champagne, at the head of a large army, Bayard defended Mézières against all assaults, and on his entry into Paris he was hailed as the saviour of his country, was made knight of the order of St Michael, and appointed commander in his own name of 160 men at arms, an honour till then confined to princes of the blood royal. He was mortally wounded by a shot from an arquebus, while defending the passage of the Sesia, April 30, 1524. He died with his face to the foe, reciting the

Miserere; and to Bourbon, who came to press his pity—'My lord,' he said, 'but pity is not for me, who die a traitor to my king; pity is for you, who bear for your prince, your country, and your religion. Highly was he esteemed for all nobles, that his death was lamented not only by king and nation, but also by his enemies. Love of virtue, especially of that kindest of virtues, justice, was so passionate, that he was wont to declare that all empires, kingdoms, and provinces where justice did not rule, were mere forests, with brigands. His body was taken by the enemy but was restored to France, and interred in the church of the Minorites' monastery, near Caen. See the Life of him by Terrebasse (5th ed. 1871), and that (1527) by his secretary, ('Le Loyal Serviteur'), of which there are translations by Sara Coleridge (1823), and (1848), and Lurehey (1883).

Bayazid', or BAYEZED, a town in Armenia, in the province of Erzerum, situated on one of the spurs of Ala Dagh, 15 miles to the SW. of the foot of Mount Ararat. Prior to 1829 its population was upwards of 10,000, and it had a brisk trade; but afterward dread of Russian encroachments drove away many of its Armenian inhabitants, and the population is now but 5000, mostly Kurds. Bayazid repeatedly been the scene of conflict. Here the Russians defeated a Turkish army in 1854, it was seized by the Russians, but was restored to the Turks at the Berlin Congress of 1878.

Bayazid' I. See BAJAZET.

Bayberry. See CANDLEBERRY.

Bay City, the fifth town of Michigan, is on the right bank of the Saginaw River, is here spanned by three bridges, 4 miles from Saginaw Bay, and 108 miles NNW. of Detroit. It is an important railway centre, and is substantially built of brick and stone, with 91 of straight streets, 10 miles of tramways, and systems of electric and one of gas lighting. Trade in timber and salt is carried on, and is some shipbuilding. Pop. (1860) 1586; (1870) 20,693; (1890) 27,839. On the opposite bank of the river are the consolidated villages of Bay City, Burton, and Barks, known as Bay City, with a pop. of 13,000; and the village of Essex (2000) adjoins the north end of the city. An act of the state legislature of 1887 provided for the consolidation of these with Bay City in 1887.

Bayer. JOHANN, a German astronomer, charts of the stars, was born in 1572, at Ilshausen, in Bavaria, and died an advocate at Augsburg. His zeal for the Protestant Church was conspicuous; that he was commonly called *der Mund der Protestanten* ('the Mouth of the Protestants'). His contributions to astronomy are contained in *Uranometria* (1603), in which he gave a plan of the heavens, constructed from the observations of his predecessors, and followed by expansion in his *Explicatio* (1651).

Bayern. See BAVARIA.

Bayeux, an ancient city of Normandy, French department Calvados, on the Aube, N.W. of Caen. Many of the houses are of wood, and the streets have a forbidding appearance. The Gothic cathedral, which is said, in Normandy—was rebuilt by William the Conqueror in 1077. The edifice dates mainly from 1106 to 1120. The west front, with its two 12th-century towers and the three sculptured porches, is a masterpiece of Norman architecture. Pop. (1881) 8006.

Bayeux Tapestry, the name given to a panorama of sewed work, representing the invasion and conquest of England by William the Conqueror, preserved in the public library of Bayeux. This is not a Tapestry (q.v.) in the usual sense of the word, but closely resembles sampler work. It is sewed on a band of linen about 230 feet long by 20 inches wide, and is divided into 72 scenes, which are generally separated from each other by a tree or other object. Most of the scenes are described by Latin inscriptions sewed along the upper margin of the tapestry. The work contains figures of 623 persons, 762 horses, dogs, and other animals, 37 buildings, and 41 ships or boats. The figures are worked in worsteds of eight different colours, dark and light blue, red, yellow, dark and light green, black, and buff. The drawing is rude, but vigorous and spirited, and no attempt is made to show local colour; horses, dogs, &c. are blue, green, red, or yellow, as may have suited the convenience of the design. To distinguish objects at different distances from the spectator, different coloured worsteds are employed, with sometimes curious effect: thus, a blue horse may have its off legs red, or a yellow one green, and so on. The method of sewing has been to cover the object with threads laid side by side, and to cross-stitch it at intervals; the faces, hands, and, where bare, the legs are simply outlined in coloured worsted. The persons mentioned by name in the inscriptions are: King Edward the Confessor, Harold, Guy of Ponthieu, Duke William, Conan, Archbishop Stigand, Bishop Odo, Eustace of Boulogne, Robert of Mortain, Leofwine, Gyth, Throld, Wadard, Vital, and Elfgva.

This pictorial history—for so it may be called, and indeed, in several particulars, it is more minute than any written history we have—opens with Harold, prior to his departure for Normandy, taking leave of Edward the Confessor. Harold is next observed, accompanied by his attendants, riding to Bosham with his hawk and hounds; and he is afterwards seen, successfully, embarking from the Sussex coast;

anchoring in France and being made prisoner by Guy, Earl of Ponthieu, redeemed by William, Duke of Normandy, and meeting with him at his court; assisting him against Conan, Earl of Bretagne; swearing on the sacred relics never to interfere with William's succession to the English throne, &c.; and finally re-embarking for England. The tapestry then represents Harold narrating the events of his journey to Edward the Confessor, whose death and funeral obsequies we next see. Harold then receives the crown from the English people, and ascends the throne; and next we have the news brought to William, who takes counsel with his half brother, Odo, Bishop of Bayeux, as to the invasion of England. Then follow representations of the active war-preparations of the Normans; their embarkation; disembarkation; march to Hastings, and formation of a camp there; the battle, the death of Harold, and the flight of the English, with which the tapestry finishes.

As an example of the Latin inscriptions describing the pictures, we reproduce one of the longest of them in reduced fac simile:

HIC WILLELM:DVX ALLOQVITVR:
SVIS:MILITIBVS:VT PREPARAREN
SE:VIRILITER ET SAPIENTER:AD
PRELIVM:CONTRA:ANGLO RV M
EXERCITV:

It may be translated: 'Here Duke William ex-horts his soldiers to prepare themselves manfully and discreetly for battle against the army of the English.' Our illustration gives the concluding portion of this scene, and represents the onslaught of the Norman knights on the English at the battle of Hastings.



Part of Bayeux Tapestry--Battle of Hastings.

Much ingenious argument has been expended on the question of the authorship of the tapestry. It has apparently been proved to demonstration that it must have been the work of William's queen, Matilda; yet others, with equal force, insist on the authorship of the Empress Matilda, daughter of Henry I. A third party, with perhaps still stronger reasons, consider it to have been executed as a decoration for the cathedral of Bayeux,

under the orders of Odo, William's half-brother, who was, in 1048, appointed Bishop of Bayeux, a see which he held for fifty years. He took an active part in the invasion of England, appears as a prominent figure in the tapestry, and was rewarded by William with the earldom of Kent. He lavished much of his wealth on Bayeux, and rebuilt the cathedral in 1077. The fact that the tapestry exactly fitted round the nave of the

cathedral, and that, with the exception of a brief visit to Paris in 1803 for the inspection of Napoleon I., it has never been out of Bayeux, seems to give strong probability to the Bishop Odo theory.

Whoever may have been the author of it, there is no doubt that strong evidence exists in the tapestry itself of its having been designed at a date, if not exactly contemporary with the events depicted, at anyrate immediately afterwards.

The earliest existing mention of it is made in an inventory of the ornaments of the cathedral in 1476, where it seems to have been used at certain seasons to decorate the nave. There it remained unknown, except to the people of Bayeux, until 1724, when a drawing of a portion of it, which came into the possession of M. Lancelot, a member of the Académie des Inscriptions, finally led to its discovery a few years later. Although it has encountered many dangers from fire, revolution, invasion, and other causes, it has passed unscathed through them all; and it exists now as complete, and with its colours as fresh, as when executed.

It passed out of the keeping of the cathedral authorities towards the end of the 18th century, and was for many years in the hôtel de ville. Here it was barbarously used, being kept on a couple of rollers and exhibited to the curious by winding from the one to the other. A knowledge of its vast value, however, gradually dawned on its custodians; and in 1842 it was deposited in an apartment built for the purpose, and placed under the care of the public librarian. This gentleman, M. Lambert, not only superintended the relining of the tapestry, but carefully and successfully restored certain portions which had suffered from age and the rollers. In 1871, during the Franco-Prussian war, the Prussians were so near the town that the tapestry was taken from the glass case in which it is displayed, and hidden till all danger was past.

The great importance of the tapestry as a contemporary record of the costumes and manners and customs of a period of such consequence in the history of England was at once recognised on its discovery, and at various times careful drawings have been made of the complete work, and about fifty works and treatises have been published concerning it. The best of these drawings was undoubtedly that made by Mr C. Stothard for the Society of Antiquaries of London. Commenced in 1816, it occupied two years' labour, and was published as vol. vi. of the *Vetusta Monumenta* by the Society in 1819. In 1872 the English Committee of Council on Education, having obtained the permission of the authorities at Bayeux, commissioned Mr Dossetter to prepare a full-sized photograph of the whole tapestry. A reduction of this photograph, edited and described by M. F. R. Fowke, and published by the Arundel Society in 1875, is the best and most complete accessible representation of this wonderful production. Our illustration has been photographed from one of the plates in this work. See Collingwood Bruce's *Bayeux Tapestry Elucidated* (Lond. 1885); *Notice Historique et Descriptive sur la Tapisserie de la Reine Mathilde* (Bayeux, 1873); *La Tapisserie de Bayeux*, by Jules Comte (Paris 1878), and also Fowke's work, which gives a very complete bibliography of the subject.

Bay Islands, a small group in the Bay of Honduras, 150 miles SE. of Belize. The cluster was proclaimed a British colony in 1852, but in 1859 they were ceded to the republic of Honduras. The chief of the six islands are Routan (30 by 9 miles; 900 feet high), and Guanaja, whence in 1502 Columbus first sighted the mainland of America. Total pop. 5000.

Bayle, PIERRE, one of the most independent thinkers of the 17th century, was born in 1634 at Carlat, near Foix, in Languedoc. The son of a Calvinist pastor, he yet studied philosophy with the Jesuits at Toulouse. The arguments of his tutors, and still more his friendly intercourse with a quiet disputation with a Catholic clergyman who lived in the neighbourhood, led him to doubt the orthodoxy of Protestantism, and shortly afterwards so far that he openly renounced his father's faith and adopted Catholicism. But in seven months the conversation of his relatives brought him back to the Protestant profession. To escape ecclesiastical censure, he withdrew to Geneva, whence he studied the philosophy of Descartes. After a few years he returned to France, and in 1675 was elected to fill the chair of Philosophy in the University of Sedan. In this office he remained until 1681, when the university was suppressed. His next appointment was that of professor of Philosophy at Rotterdam. The appearance of a comedy in 1680 having given occasion to a widely spread alarm, Bayle in 1682 published his *Pensées diverses sur la Comédie*, a work full of learning, and treating, in discursive style, many topics of metaphysics, ethics, theology, history, and politics. This was followed by *Critique Générale de l'Affaire du Calvinisme de Maimbourg*. In 1684 he commenced a periodical, *Nouvelles de la République des Lettres*, one of the first successful attempts at a popular journal of literary criticism. The revocation of the Edict of Nantes led Bayle to write his *Commentaire Philosophique sur les Paroles de l'Evangile: Contre les déistes*, which professed itself to be a translation from the English, and contained a strong defence of the principle of toleration. In consequence of the accusations brought forward by the theologian Jurieu, who regarded Bayle as an agent of France, and the enemy of Protestantism, Bayle though he skilfully defended himself, was in 1693 deprived of his license to teach. He now assiduously devoted his leisure to the *Dictionnaire Historique et Critique* (1st ed. 2 vols. Rotterdam 1696; latest ed. 16 vols. Paris, 1820). This was the first work published under his own name. Again Jurieu came forward as Bayle's adversary and induced the consistory of Rotterdam to censor the Dictionary, chiefly on account of the supposed irreligious tendency of the article on 'David', in the commendation bestowed on the moral character of certain atheists. Bayle promised to expunge the objectionable matter; but afterwards, when he found that the public entertained a different and more favourable opinion of the passages than the Rotterdam Consistory, he judged it best to allow them to remain as they were, or made slight alterations. New opponents were called into the arena by his *Reponse aux Questions Provinciales*, and the continuation of his *Pensées de la Comédie*. Jacques and Leclerc now attacked his religious opinions, while others persecuted him as the enemy of Protestantism and of his adopted country, Holland. These literary and theological controversies had a bad effect on his failing health, and a disease, for which he refused to seek medical aid, proved fatal. He died Dec. 28, 1706.

Accustomed to view every question scrupulously on all sides, Bayle was accused of doubt on religious matters generally; at least, not to be denied that his scepticism disbelieved the wisdom of the religious dogmatism that both Catholics and Protestants in his day showed hostility to bigotry rather originated in difference to the doctrines about which they quarrelled, than in any clear conviction.

iniquity of religious persecution. His scepticism was not based on a philosophical theory, but was rather that of an accomplished littérateur. With great eloquence and persistency he vindicated the doctrine that moral characteristics may flourish independently of particular religious opinions. His learning was perhaps more varied and erudite than precise; his style is clear and natural, fluent but diffuse. Many articles in the Dictionary seem to have been chosen merely as vehicles to introduce numerous digressions in notes, not a few of which are prolix and uninteresting; but the greater number of the articles are characterised by good sense, logic, critical acumen, and learning. The work was proscribed both in France and Holland, was consequently very widely diffused in both countries, and exercised an immense influence over the literature and philosophy of the Continent. It was the dawn of the scepticism of the 18th century, and may be historically regarded as the protest of the enlightened human intellect against the irrational dogmatism of the churches. In his personal character, Bayle was amiable, obliging, disinterested, and modest, but at the same time morally courageous and independent. His *Œuvres Diverses* were published in four volumes at the Hague (1725-31). See Life of Bayle, in French, by Desmaizeaux (Amsterdam, 1730), and in German by Feuerbach (1838).

Bayly, THOMAS HAYNES, an English song writer and author, was born at Bath, October 13, 1797. After deserting successively both law and the church, Bayly, during a short sojourn amid the brilliant society of Dublin, first discovered his own powers as a ballad writer and a biassed his earliest successes. In 1824 he settled in London; and his *I'd be a Butterfly* was quickly followed by *The Soldier's Fare, We met 'Twas in a Crowd, She wore a Wreath of Roses, Oh, no, we were meeting her*, and many others familiar wherever the English language is spoken. Bayly also wrote a novel, *The Adversary*. Several volumes of verse, some tales, and numerous dramatic pieces, the best of which was *Perfection*, a clever little comedy, produced by Madame Vestris, and once very popular. In his last years he suffered much from confirmed jaundice and dropsy, which brought about his death, April 22, 1839.

Bayne, PETER, born at Fodderty, Ross shire, 19th October 1830, studied at Marischal College, Aberdeen, and became editor of newspapers successively in Glasgow, Edinburgh, and London. He is author of *Christian Life at the Present Time*, *The Life of Hugh Miller* (1871), *Lessons from my Masters*, *Two Great Englishmen*, and a *Life of Luther* (1887).

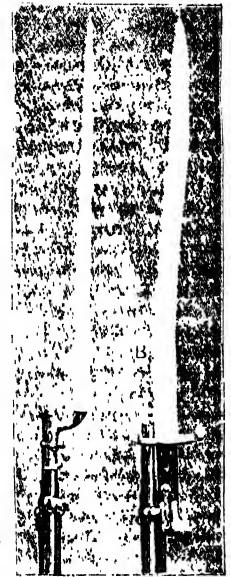
Baynes, THOMAS SEXTON, born at Wellington, Somerset, 24th March 1823, studied at Bristol College and Edinburgh University. At Edinburgh he became assistant to Sir William Hamilton, publishing a translation of the *Præceptorum Logicæ* (1851), and an *Essay on the New Analysis of Logical Forms* (an exposition of Hamilton's *Quantification of the Predicate*). In 1857-64 he was assistant-editor of the *Daily News*, and in 1864 became professor of Logic, Rhetoric, and Metaphysics in the university of St Andrews, where he remained till his death, 30th May 1887. He wrote much for reviews and magazines, and was editor of the ninth edition of the *Encyclopædia Britannica* (vols. i. xxii. 1875-87).

Bay of Islands, a safe and extensive harbour on the east coast of the northernmost portion of the North Island of New Zealand. It is about 11 miles across, and is so named from the numerous islands (numbering nearly a hundred) with which it is studded. Vessels of any draught may enter.

Russell, the chief shipping port in the north of New Zealand, is on its south side.

Bayonet, supposed to be named from Bayonne, of which Pusségar, its alleged inventor (circa 1650), was a native, is a dagger or small spear fixed at the end of a musket or similar weapon. According to some authorities, the bayonet is just the Malay Kris (q.v.), introduced by Dutch soldiers from the East Indies; anyhow, it is certain that bayonets were manufactured at Bayonne in 1663. These, called *bayonets à manche*, had handles which fitted into the muzzle of the guns; but the *bayonet à double*, or socket-bayonet, fitting round the barrel, so that the musket could be fired with the bayonet fixed, was invented by General Mackay in 1689, and introduced by Vauban into the French army in 1703. Bayonets are of two patterns. That with which the rank and file of the British infantry are armed is triangular in section, fitting round the rifle barrel by means of a socket, is 22 inches long, weighs

15½ oz., and is only adapted for thrusting; while the sword-bayonet is a cut-and-thrust weapon of the same weight, 24 inches long, sharpened on its front edge, and sometimes saw-backed; its hilt fits round the barrel, and its handle on to a button at the side of it. It is carried by rifle regiments, gunners, engineers, departmental troops, all infantry regiments, and seamen, being better adapted to the shorter rifle with which they are armed. The triangular socket-bayonet is made at the government rifle factory at Enfield as follows: Two pieces of metal are first selected, one of the very best cast-steel, 7 inches long by 7 inch square; the other of the best wrought-iron, 4 inches long by about 1 inch thick, and welded together. The steel forms



A, Bayonet;
B, Sword-bayonet.

the blade, the iron the socket handle. A forging-machine gives a rough outline of the required shape. Then a swaging-machine, with dies and counter-dies, comes down upon the metal with great force. The metal is then annealed; turned in a cutting-machine to remove a wire edge thrown up in the act of stamping; cut to a proper length; the socket end made square; the blade drilled and bored, shaped and turned, bent at the neck, hardened, tempered, and finished by several minor operations. The sword-bayonets are supplied by contract. According to *The Times* of 11th February 1886, 'one-third of the British army is armed with weapons which will fail our soldiers in the hour of need'; and this remark was to a great extent verified during the operations in the Soudan, where many bayonets of both patterns were twisted and bent in charging—especially some naval sword-bayonets which had been made out of old cutlass blades. To guard against a repetition of this, all the bayonets in use in the United Kingdom were re-tested early in 1887. The triangular bayonets were sprung on all three faces round a curved block 2½ inches high in the centre, struck twice on each flat, gauged and twisted

from point to socket through a quarter of a circle. Out of 166,000 thus tested, upwards of 70 per cent. passed the tests, the failure being amongst those longest in use. The 35,000 army sword-bayonets were similarly tested, and 96 per cent. passed. Troops at home are now furnished with bayonets which have been re-tested, and supplies of the same have been sent to those abroad. All new weapons now have to pass the above tests, and a contract (1887) for sword-bayonets required that the blade should stand a weight of 160 lb. on the point without the slightest deviation, and a blow on the back of 170 lb. from a proving machine. The dagger-like bayonet for the magazine-rifle (see RIFLE) is quite unlike the others.

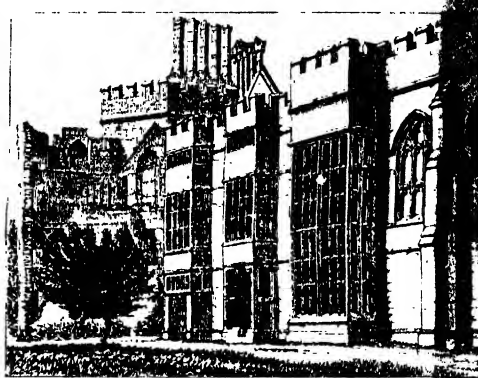
Bayonne, one of the most strongly fortified towns of France, in the department of Basses-Pyrénées, situated at the confluence of the Adour and Nive, 4 miles from the mouth of their united waters in the Bay of Biscay, and 63 miles WNW. of Pau by rail. The two rivers divide the town into three parts: Great Bayonne, Little Bayonne, and St. Esprit. Pop. (1872) 27,173; (1881) 29,957. Many of its streets are narrow and dark, but the town still wears an air of wealth and comfort, spite of its declining prosperity from the competition of the railway and the gradual filling up of the mouth of the Adour. The river formerly emptied by a mouth 12 miles farther north than its present one, which it opened for itself in the 16th century. The manners of the inhabitants as well as the architecture remind us of Spain, only 22 miles distant, but among the poorer natives the Basque type and the Basque tongue are predominant. Of the seven churches the finest is the cathedral, in the oldest part of the town, begun in the 13th century, with its three naves, its stately portal, and its elaborate roof. The citadel, on a height in St. Esprit, was one of Vauban's masterpieces. Having opened its gates only during the armistice in 1814, it still bears its proud motto, '*Namquam pallata*.' The chief manufactures are brandy and liquorice, besides chocolate, leather, tobacco, and glass (especially bottles); and in these products, together with wine, corn, cork, wax, oil, wool, and the celebrated Bayonne hams, there is a large trade with Spain and Northern Europe. Bayonne belonged to the Duchy of Aquitaine, then to Gascony, and was in the hands of the English from 1152 to 1151. During the wars with Spain it was often besieged, but never taken. Here the great Napoleon cozened Charles IV. out of the crown of Spain, after he had ineffectually endeavoured to get Ferdinand VII., to whom Charles had previously resigned it, to give it up. In 1814 it was besieged in vain by the British and Spanish allies, and was the scene of a series of desperate bloody struggles. In five days' fighting on the banks of the Nive, south-east of Bayonne (December 1813), the French lost 6000 men, the allies upwards of 5000, and in the bloody sortie from Bayonne of April 1814, as many as 800 English soldiers fell.

Bayonne, a city of New Jersey, U.S., about 6 miles SW. of New York by rail. It is made up of four former villages, lying along the narrow peninsula to the south of Jersey City, between New York and Newark bays, and has a large coal-dock, and chemical and other works. Pop. (1880) 9372; (1890) 19,033.

Bayreuth. See BAIREUTH.

Bay-window, or (corruptly) **Bow-window**, a window peculiar to late Gothic and Renaissance architecture, so called because it forms a *bay* or projecting space outwards from a room. The external walls of bay windows are, for the most

part, either rectangular or polygonal, the circular form, from which the term *bow* was probably derived, having been unknown prior to the introduction of the debased Gothic. The



Bay-window; Cowdray House, Sussex (from Parker).

mentioned by Chaucer, bay-windows are no found in any of the styles before the Perpendicular, during the prevalence of which they were frequently introduced, particularly in halls. Bay windows generally reach to the floor, and are frequently supplied with a seat, which is called the *bay stall*. There are many very beautiful examples of bay-windows in the college-halls of Oxford and Cambridge. When used in upper stories, such windows are supported on corbels, or large projecting mouldings. See ORIEL.

Baza, an old town of Spain, 50 miles ENE. of Granada. It lies in a fertile plain, has remains of Moorish fortifications, a sulphur-spring, and (1878) 12,992 inhabitants engaged in the production of wine, fruit, and hemp. The *Bastar* of the Romans, and *Bastania* of the middle ages, Baza under the Moors was a flourishing town, with a population of 50,000.

Bazaar, or **BAZAR** (Pers. *bāzār*), an oriental market-place, either open or covered, where various articles, including slaves, are exposed for sale, and where eastern merchants meet for transaction of business, as on Change or at the Bourse in England and France. The bazaar in Isfahan is one of the finest; that in Tabriz perhaps the largest. The great bazars of Constantinople and Cairo are better known to Europeans. Among western peoples, establishments for the sale of fancy-goods are now often styled bazars. The name is also commonly applied to a sale of miscellaneous articles contributed gratuitously, for the purpose of raising money for a charitable or other special purpose.

Bazaine, **FRANÇOIS ACHILLE**, a marshal of France, born at Versailles, 13th February 1811. Entering the army in 1831, he served with distinction in Algeria, in Spain, in the Crimea, and in the Italian campaign of 1859. He took part in the French expedition to Mexico in 1862, and from 1864 till the end of the war held supreme command of the French forces. Already, in 1836 in Africa, he had gained the cross of the Legion of Honour. In 1856 he had been promoted to be Commander of the Legion; in 1863 he received the Grand Cross, and in 1869 he was made commander-in-chief of the Imperial Guard. At the outbreak of the Franco-German war with Germany, Bazaine was placed at the head of the 3d army corps near Metz. After the battles of Wörth and Forbach he took command of the main French armies, and on August 14, 1870, began a retreat from Metz. Defeated at

Mars-la-Tour and Gravelotte, he retired within the fortifications of Metz, which was immediately invested by Prince Frederick Charles. Attempts to escape failing, Bazaine capitulated October 27, when 3 marshals, over 6000 officers, and 173,000 men laid down their arms and became prisoners of war. In 1873 Bazaine was tried by a court-martial, and sentenced to degradation and death for having failed to do his duty. The sentence was commuted to 20 years' imprisonment. But in 1874 Bazaine contrived to escape from the fortress on the Ile Ste Marguerite, near Cannes, where he was confined, and ultimately he made his way to Madrid. He published in 1883 a justification of himself in *Episodes de la Guerre de 1870 et le Blocus de Metz*, which was immediately prohibited in France. He died 23d September 1888.

Bazard, SAINT-AMAND, a French Socialist, was born at Paris in 1791. After the Restoration he helped to found the revolutionary society of the 'Am. de la Vérité,' and in 1820 an association of French Carbonari. He was the leading conspirator in the 'plot of Belfort.' In 1825 Bazard, impressed with the necessity of a total reconstruction of society, attached himself to the school of Saint-Simon, and became one of the editors of a Saint-Simonian journal termed *Le Producteur*. In 1828 he delivered at Paris a series of lectures, the substance of which was published in the *Exposition de la Doctrine de Saint-Simon* (2 vols. 1828-30), of which the first part was by Bazard, the second being chiefly the composition of Enfantin. He and Enfantin became the acknowledged leaders of the school. After the July revolution (1830) a larger scope was afforded to the Saint-Simonians. The masses were attracted by the doctrine that 'all social institutions ought to have for their end the moral, intellectual, and physical amelioration of the poor.' In a short time Bazard and his friends had created a new society, living in the midst of the old. New peculiar laws, manners, and doctrines. But Bazard's connection with it was of short duration. He differed from Enfantin on the doctrine of the emancipation of women, and in 1831 seceded in disgust. His efforts to found a school of his own proved unsuccessful, and during a heated discussion with his former friend Enfantin, he was struck with apoplexy, from the effects of which he never recovered. He died 29th July 1832.

Bazardjik, a town of Bulgaria, 26 miles N. of Varna, has an important fair in April. Pop. (1881) 845. Founded 300 years ago, it was stormed by the Russians on 2d June 1771, and 3d June 1810.

BAZAR-BAZARDJIK, a town of Eastern Roumelia, in the Upper Maritza, 23 miles W. of Philippopolis by rail, with warm baths, and 13,000 inhabitants, having greatly increased since the Russo-Turkish war of 1877-78.

Bazelles, a village in the French department of Ardennes, near the right bank of the Meuse, 1 miles SSE. of Sedan. A pretty, well-to-do place, it was burnt to the ground by the Bavarians on the day of the battle of Sedan (1st September 1870), in revenge either for its obstinate defence by the marines, or for the villagers having fired on the invaders, and maltreated some of their wounded. It was rebuilt, in great measure with English contributions, and now has some 2000 inhabitants.

Bazigars, a tribe or natives scattered over India, known also as Panchpiri, Kumpia, or Nats, most of whom lead a nomadic life. They do not intermix with the Hindus. It has been remarked that they have some features of resemblance to the Gipsies of Europe and Asia. They are of seven castes: the Bazigars proper are Mohammedans in religion and habit; the Panchpiri have no set system of religion, but with native flexi-

bility adopt that of the village or place where they may be sojourning. The men collect medicinal herbs, exhibit wild beasts, or sell munts of their own manufacture, are adroit jugglers, and excel in feats of activity; some of the women sell trinkets, and excel in lascivious dances; others practise physic and cupping. They are short-lived, owing to their lives of systematic debauchery.

Bazoche, or BASOCHÉ, the guild of the clerks of the parliament of Paris, under a mock king, to whom Philip the Fair granted the privilege of performing religious plays in 1303. The officers of this harmless monarchy affected on all occasions the language of royalty. Its jurisdiction included the consideration and decision of all controversies that arose among the clerks, and it administered justice twice a week. At the carnival the members acted a species of satirical Morality (q.v.), in which they made extensive use of the liberty granted to them, in ridiculing vices and the favourites of fortune. Of course, they could not fail to provoke enmity and occasion serious scandal, and in 1540 they were interdicted as incorrigible. They are interesting, however, as the forerunners of the comedy of Molière.

Bdellium, a gum resin resembling Myrrh (q.v.) in appearance and qualities, but weaker, and at the same time more aerial. High medicinal virtues were ascribed to it by the ancients, but it is now little used internally, although occasionally employed as an ingredient of plasters. It is supposed to be the produce of *Amyris Commiphora* in India, and of *Balsanodendron Africanum* in Senegal; trees or shrubs belonging to the natural order Amyridaceæ (q.v.), so remarkable for the number of similar substances which it produces. Egyptian bdellium, however, is obtained from the Doom palm, *Hyphaene thebaica*. A similar substance is yielded also by *Cercidia ficata*, of the natural order Compositæ; whilst the Sicilian bdellium, formerly used in medicine, is produced by *Daucus gummi-fica*, a species of the same genus to which the carrot belongs. The bdellium mentioned in Gen. ii. 12 and Num. xi. 7 may be this or a similar gum-resin; some have, with more probability, understood it to be a precious stone—a carbuncle, crystal, beryl, or pearl.

Beaches, RAISED. Geology teaches that the frame of the land is liable to risings and depressions, even in the present age. Several districts in different parts of the world have been raised, in consequence of earthquakes, within the memory of the present generation; and there is evidence to show that the coast of Siberia east of the Lena, Spitzbergen, Nova Zembla, and the Scandinavian Peninsula (with the exception of Scania, in the extreme south), have been recently elevated. These facts prepare us to learn that, around the British Islands, and in other parts of the earth, there are tracts of ground at various elevations above the present sea-level which have evidently been sea-beaches at a former time. The evidences consist of, first, the levelness of the ground in the general direction of the present shores over considerable spaces; second, the alternating beds of sand and gravel, such as we see composing the present beach; and, third, the presence of marine littoral shells. There are also what may be called terraces of erosion—indentations made in a rocky coast by the lip of the sea in ancient times—usually consisting of a flat platform presenting patches of gravel, and of a backing wall or sea cliff, the latter sometimes penetrated with deep caves. In Scotland there are several well-marked raised beaches, at 100, 75, 50, 45-50, 25-30 feet above the present sea-level. These beaches are best seen about the maritime regions of Central Scotland. Most of the

seaport towns are built upon the 25-30 feet beaches. Similar beaches are found in Ireland, and likewise in England, where, however, they do not occur at a greater elevation than 20 to 30 feet above the sea. Terraces of marine erosion (*Strandlinien*) occur in Northern Norway at various levels, up to a height of 600 feet or thereabout. In high Arctic regions raised beaches are also common phenomena. Some of the most remarkable examples, however, occur in South America, where Darwin noticed them at various levels, from 65 feet up to 1000, and even 1300 feet (near Valparaiso), above the existing sea-level. See Dr Robert Chambers, *Ancient Sea Margins* (1848), and the standard works on geology.

Beachy Head, the loftiest headland on the south coast of England, projecting into the English Channel, 3½ miles SSW. of Eastbourne, Sussex. It consists of perpendicular chalk-hills, 575 feet high, forming the east end of the South Downs. Several caverns have been cut out in the rock, for shipwrecked seamen to take refuge in; but shipwrecks have been far fewer since 1831, when the Belle Tout Lighthouse was built 2½ miles to the west. This lighthouse is 285 feet above the sea, and is seen above 20 miles off. The view from Beachy Head, in clear weather, extends to Hastings, the Isle of Wight, and France. The cliffs are the resort of myriads of sea-fowl. Off this point, the French fleet, under Tourville, beat the combined English and Dutch fleets, under Torrington, 30th June 1690.

Beacon denotes any signal set upon a height, but especially the alarm fires at one time used to spread the intelligence of foreign invasion or other great event. These fire signals were in use in the earliest times, and notices of them are found in the literary remains of ancient Persia, Palestine, and Greece. They were made by kindling a pile of wood on the tops of lofty mountains, and keeping the flame bright by night, or having the fire so covered as to emit a dense smoke by day. There were various preconcerted modes of exhibiting the light or smoke, so as to indicate the nature of the intelligence. Thus, an act of the parliament of Scotland in 1455 directs that one bale on fire shall be warning of the approach of the English in any manner; two bales blazing beside each other, that they are coming in *deed*; and four bales, that they are coming in great force. *Bale* is akin to the Sansk. *bahals*, 'lustre'; *beacon* is a word of doubtful etymology, not found beyond the Teutonic languages.

An early instance of beacon signals is found in the book of the prophet Jeremiah, in his call, in chap. vi. 1, to the people of Benjamin to kindle a fire-sign on one of their mountains: 'Set up a sign of fire in Beth-haccerem: for evil appeareth out of the north, and great destruction.' Another ancient instance of the use of a line of beacons occurs in the *Agamemnon* of Æschylus. The Greek commander is represented as communicating the intelligence of the fall of Troy to his queen, Clytemnestra, at Mycenæ, in the Peloponnese. The line consists of eight mountains, and the news is supposed to be conveyed in one night from Troy.

In England the beacons were kept up by a rate levied on the counties, and had watches regularly stationed at them, and horsemen to spread the intelligence during the day, when the beacons could not be seen. They were carefully organised when the Spanish Armada was looked for. In 1856 an old beacon-work on Malvern Hill, which had done its part in former days in spreading the intelligence of the appearance of the Armada, of the Dutch fleet, and of the Young Chevalier, was lighted up in anticipation of the close of the Crimean war, and afforded an interesting entertainment to scientific persons in estimating the distance at which the blaze

could be seen from distant hills. Again, on the night of 21st June 1887, a multitude of beacons, throughout the length of the coast, received their signal from Malvern Hill, taken for its transmission thence to the country being seven minutes.

Beacon, in maritime affairs, is an erect structure of stone, timber, wrought-iron, cast iron, or copper, placed upon a rock or bank dry at low water, covered at high water, and lying near the trade shipping, either on the open coast or in navigable rivers or estuaries. All beacons on the open coast, or on locks used as harbours of refuge, are erected in England by the Corporation of Trinity House, London; in Scotland by the Commissioners of the Northern Lighthouses; and in Ireland by the Ballast Board of Dublin. In navigable rivers they are erected by the improvement trustees. Dues for beacons are not levied upon shipping by the national authorities. On the open coast, beacons are made of a considerable size, to give a chance of their being made out in the dark, and also of great strength, to resist the shocks of the heavy breaking seas which fall upon them.

In Scotland the principal examples of stone beacons are those on the South Carr Rock in the Firth of Forth, the North Carr Rock off Fife Ness (which is partly of cast-iron), the Beamer Rock at Queensferry, and the Guntocks in the Firth of Clyde. The two former of these, being exposed to a very heavy sea, are built solid of hard stone joggled together, and are 42 feet in height and 14 feet in diameter at the base. Iron beacons are open pyramidal structures, surmounted by a cage or barrel-shaped top (fig. 1). They cost from £50 to £120; or £1400, the heavier cost applying to the larger class in exposed situations, and when the rock is low in the water. Belonging to this latter class may be named Cairnbulg Brigs, Covesea Skerries, Stroma Skerries, Cantick Head, Lother Rock, &c. One of the main columns of these large beacons is provided with steps, so that any one cast upon the rock or reef may ascend to the cage on the top, which is capable of holding eight or ten persons.

Two principal types are followed by the national authorities. Fig. 2 represents the class of beacons

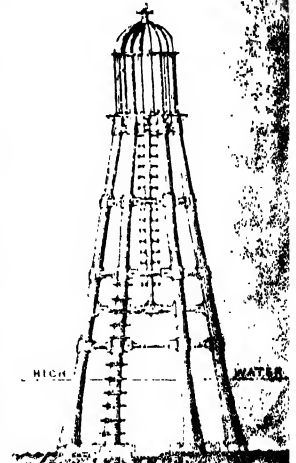


Fig. 1. Elevation of a First-class Cast-iron Beacon; total height above high water, 50 feet.

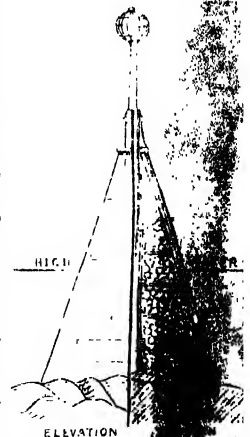


Fig. 2. Total height above high water.

used by them for rock foundations. It consists of strong cast-iron plates, closely fitted and securely bolted together, the interior being filled with Portland cement rubble; and surmounting it is



Fig. 3.—Section of Wrought-iron Cylinder Beacon; height above high-water, 30 feet.

an iron mast, carrying a ball, triangle, diamond, or cone, as its locality may require. As much as £11,000 has been spent in one instance on the erection of such a beacon. Fig. 3 represents the beacon on the Girdler Bank, in the Thames, and is a type of the class of beacons used for sand-banks. It consists of a wrought-iron tube, 2 feet 7 inches in diameter, sunk into the sand, with a second length of tube added, to carry the beacon above the high-water level. In the latter is secured the mast which carries the distinguishing mark of the position. Other forms also are used. The Monkstone, in Bristol Channel, has an erection of masonry in the form of a tower, with a stair of ascent from the rock to the top, which is protected by an iron railing; and on Old Law, Holy Island, the beacon takes the shape of a lofty obelisk of stone, which forms an important sea-mark. On the Irish coast, simple perch beacons, initialed or otherwise distinguished, are common, as on the Carrick Rocks, near Wexford, and on Foreland Point, at

the entrance to Belfast Lough.

Beacon Lighting. It has been proposed to light up beacons by electricity from the shore, but it has not as yet been successfully accomplished. Experiments conducted with this object by the Northern Lighthouse Commissioners showed that a spark could be produced that was visible in clear weather for a distance of about a mile; but the result did not justify the adoption of the system. There are instances, however, of beacons lighted by gas with perfect success. The Clyde Lighthouse Trustees have erected an iron tower on a bank off Port Glasgow Harbour, to which a gas-pipe has been led under water, and carried up to the lantern on the top. The gas is turned down during the day and raised at night by a stop-cock on shore. Another instance is the beacon erected by the Clyde Lighthouse Trustees on the Gantocks Rock, near Dumoon. The beacon is of stone, surmounted by an iron tank which holds about one month's supply of compressed gas, on Pintsch's principle; above this tank is placed the lantern containing the dioptric apparatus. The light burns day and night. The gas is supplied to the tank from the tender belonging to the Trust; this is fitted with tanks which are charged at their gas-work at Port Glasgow with gas raised to a pressure of ten atmospheres. The gas is passed from the vessel to the beacon by means of a strong india rubber tube. The tank on the beacon is charged to six atmospheres. Four beacons lighted on Pintsch's principle have been erected in the Clyde, one in the Thames, three in the Suez Canal, one at Pillau, Germany, one in Holland, and one on Romer Shoal, New York. Where a beacon is placed near a lighthouse, as at Stornoway, it may be lighted by a beam of light projected from the lighthouse, which is reflected seaward by an apparatus placed upon the beacon. See BOY, LIGHTING, &c.

Beaconsfield, a quiet little market-town of Buckinghamshire, 10 miles N. of Windsor. It is noteworthy as the home and the burial-place of

the poet Waller and of Edmund Burke, and as having given his earls title to Benjamin Disraeli. Pop. of parish (1881) 1,635.

Beaconsfield, BENJAMIN DISRAELI, EARL OF, statesman and novelist, was born 21st December 1804, in London, most likely at 6 King's Road, Bedford Row. He was the eldest son of Isaac D'Israeli (q.v.) and Maria Basevi, and was the descendant of a Jewish family which, driven from Spain by the Inquisition towards the close of the 15th century, had taken refuge in Venice, and thence had migrated to England in 1748. He was duly circumcised at the Spanish Synagogue in Bevis Marks, but in 1817, a boy of twelve, was baptised at St Andrew's, Holborn, with Sharon Turner for godfather, and entered thus on all the privileges from which the Jewish race was still debarred. He was educated partly at a private school kept at Walthamstow by a Unitarian minister; in 1821 was articled to a solicitor; in 1824 entered Lincoln's Inn, and kept nine terms; but in 1831 had his name removed from the books. In 1826 he published the first part of *Curran Grey*, not an over-bold forecast of his own achievements, so sparkling, arrogant, and egoistic, so full of piquant burlesque of the men and events of the day, that it straightway became the talk of the town, and gained him admission to the Blessington coterie. The second part, now little read, succeeded in 1827; the Gulliverian *Captain Popenilla* in 1828; and the high flown *Young Duke* in 1829. In 1830-31 he took a twelvemonth's holiday in the Mediterranean, visiting Spain, Venice, Jerusalem (the homes of his ancestors), and describing his doings in the fourteen graphic *Home Letters* (1835), where we see him young, brilliant, foppish, affectedly affected, just as we know him in Macfise's portrait.

He returned to England to find the country in the throes of the Reform Bill; and in 1832 stood twice for Wycombe as an advanced Radical, backed by O'Connell and Joseph Hume. He failed both times, and failed again in 1835, when as a Tory he contested Taunton, quarrelling with O'Connell, and sending a challenge to O'Connell's son. Not until 1837, the first year of Victoria's reign, did he enter parliament, as member for Maidstone. Meanwhile he had published *Contarini Fleming* (1832), a 'psychological romance,' a 'story of the development and formation of the poetic character;' *The Wondrous Tale of Alroy* (1833), a stilted romance of the 12th century; *The Revolt of the Rebels* (1834), a blank-verse rhapsody, the idea of which was conceived on the plains of Troy, and which justified tyrannicide in a passage expanded from the 1864 edition; *Vindication of the English Constitution* (1835); *Henrietta Temple* (1836), a 'love story,' a lawless one; and *Venture* (1837). Here Byron and Shelley figure thinly disencased. His maiden speech, on Irish election petitions, was clever enough, yet was greeted with shouts of laughter, till, losing patience, he cried, almost shouted: 'I have begun several things many times, and have often succeeded at last; ay, and though I sit down now, the time will come when you will hear me.' In less than nine years that time did come. A reckless free-lance at first, persistent in little save hatred of the Whigs, he had risen since 1842 to be head of the 'Young England' party, when suddenly, from the hour of his savage onslaught on Sir Robert Peel in the Corn-Law debate of 22d January 1846, he became the real leader of the Tory Protectionist squires, though their nominal chief for two years was Lord George Bentinck (q.v.). To this period belong *Coningsby* (1844), *Sibyl* (1845), and *Tancred, or the New Crusade* (1847), a trilogy intended to set forth the origin and conduct of political parties, the consequent condition of the people, and the duties

of the church as a remedial agency. The 'Young England' creed in fact, *plus* the 'Asian mystery.' As Chancellor of the Exchequer and leader of the Lower House in the brief Derby administration of 1852, he coolly discarded Protection, and came off on the whole with flying colours; still, his budget was rejected, mainly through Mr Gladstone's attack on it; and Mr Gladstone succeeded him, in the Aberdeen coalition ministry. In 1858 he returned, with Lord Derby, to power, and next year introduced a petty measure of parliamentary reform—his 'fancy franchises' bill—whose rejection was followed by resignation. For seven long years the Liberals remained in office; and Disraeli, in opposition, displayed talents as a debater, and a spirit and persistency under defeat that won for him the admiration of his adversaries. With his return to the post of Chancellor of the Exchequer, in the third Derby administration (1866), came the strangest episode in all parliamentary history. He introduced and carried a Reform Bill (1867), far more democratic, more sweeping in its character, than one just rejected by the Conservatives and malcontent Liberals. True, a tentative measure was first put forward, every whit as unsatisfying as its predecessor. It would not do; none saw that sooner than Disraeli himself; so throwing overboard dissentient colleagues, among them Lord Cranborne (future Marquis of Salisbury), he produced a bill giving household suffrage in the boroughs, and widely extending the county franchise. It was 'a leap in the dark,' Lord Derby's own phrase; the leap at any rate was boldly taken. In February 1868 he succeeded Lord Derby as premier; but, in the face of a hostile majority, he resigned in the following December. On this occasion, Mrs Disraeli, in acknowledgment of her husband's services, was raised to the peerage as Viscountess Beaconsfield, an honour she survived only till 15th December 1872. The rich widow, fifty years old, of his first colleague, Mr Wyndham Lewis, she had married Disraeli in 1839. In 1870 appeared *Lathair*, a novel of which a reviewer in *Blackwood's* (Lord Salisbury, said rumour) observed that, 'on the whole, we had rather Mr Gladstone had written it.'

In 1874 Disraeli entered on his second premiership, the first two years of which were marked by the abolition of church patronage in Scotland, by an act to put down Ritualistic practices, and by one excellent measure, to protect British seamen against 'floating collins,' which was forced on the government by Mr Plimsoll. But a spirited foreign policy was more to Disraeli's taste than humdrum domestic reforms. In 1875 he made Britain half-owner of the Suez Canal; and in 1876 he conferred on the Queen the new title of Empress of India, himself the same year being called to the Upper House as Earl of Beaconsfield. He had sat for Shrewsbury from 1841 to 1847, and thenceforward for Buckinghamshire. A free career was opened to his enterprise by the outbreak of insurrection in the Balkan Peninsula. Himself, he pool-pooled the 'Bulgarian atrocities,' and was all for upholding Turkey as a bulwark against Russian aggression. When Constantinople seemed threatened, a British fleet was despatched to the Dardanelles, six millions were voted for military and naval purposes, and an Indian contingent was summoned to Malta. It was very magnificent; after all, though, it was not war, for the Berlin Congress (1878), which Lord Beaconsfield himself attended with Lord Salisbury, and which raised him to the zenith of his fame, gave back to Russia all she had lost by the Crimean war, and left Turkey the de-facto of her former self. England's share was 'Cyprus with honour'—and with Cyprus,

ment. The Afghan and Zulu wars combined with commercial depression and with troubles in Ireland to sicken the country of an 'Imperial' policy; and the general election of 1880 returning a large Liberal majority, the government resigned before the meeting of parliament. That ex-premier employed his leisure in publishing *Endymion*, like so many of his novels the story of a fortunate politician. On 19th April 1882 he died at his London residence in Curzon Street, and the terms of his will precluding a public funeral in Westminster Abbey, he was buried, at Hughenden, near Wycombe.

'It was one of the first principles of Mr Vivian Grey that everything was possible; none ever accomplished that principle better than Lord Beaconsfield. Member of an alien and persecuted race, a race without settled resting-place or civil rights, he rose to be champion of a proud landed aristocracy, the trusted friend of Britain's queen, an arbiter of Europe's destinies. We stand too near him now, rightly to determine his claim to greatness; but this one may safely say for praise or blame, according to men's judgments—that, in almost everything he was the very opposite of his great adversary, Mr Gladstone. He was a master of epigram, a splendid debater, rather than an orator; he possessed that first-rate requisite of statescraft, lack of zeal; he was not one to be idolized or detested. Throughout he was faithful to his two leading beliefs—in the Jewish race, and in intellect (incarnate both in himself); throughout he was loyal, ay, as a Swiss guard, to his adopted country. It may be hard to decide whether he was a genuine Tory, whether he was not chiefly a hater of the Whigs. At least, he was a true leader, for he led the Tories always whither he would himself, and often whither themselves they would never have gone. In his famous Edinburgh phrase (1867), he 'educated' his party. The masses owe to him their first enfranchisement, and obtain by him was for a while rehabilitated as one of the Great Powers. His novels are as pleasing as himself. They are brilliantly clever, witty and entertaining; but one vainly looks in them for humour, pathos, any of the deeper qualities. They will always, however, be read for the key they furnish to their authors' character, and for their caricatures of his contemporaries. Lord Brougham as 'Foaming Fudge' in *Lionel Lincoln*, and Canning as 'Cherlatan Gas' in *Lionel Lincoln* as the hero of *Cromwell*, Croker as 'Rigby' Mr Gladstone as 'Oswald Millbank' of *Palmerston*, in *Endymion*, as 'Lord Roehampton,' and so forth.

See GLADSTONE, YOUNG ENGLAND, HUGHENDEN, THOROSE LEAGUE, and works cited under those articles. *See, too, Lord Beaconsfield's Correspondence, with his own notes, 1832-52* (1886); his *Selected Speeches*, (edited by Keble, 2 vols. 1882); an article on his novels, by Leslie Stephen, in the *Fortnightly* (1874); G. C. Thompson's *Public Opinion and Lord Beaconsfield* (1886); Sir W. Fraser's *Disraeli and his Days* (1891); and the Lives of him by John Mill (1863), O'Connor (hostile, 1879), Brandes (Danish, 1878; Eng. trans. by Mrs Sturge, 1880), Chevalier Claryng (French, 1880), Ewald (1882), Hitchman (3d ed. 1885), Keble (1888), and Froude (1890).

Bead, in Architecture, a small round moulding, sometimes called an *astragal*. It is of frequent occurrence in architecture, in picture-frames, and in other objects carved in wood.

Beadle is an inferior parish-officer chosen and appointed by the vestry. His business is to attend the vestry, to give notice of its meetings to the parishioners, to execute its orders, and generally to do and execute all the orders and business of the vestry and of the parish, as their messengers.

messenger or crier of a court, to the inferior church-officer and attendant of a clergyman in Scotland, and, as *bedell*, to the bearer of the mace in public processions in a university.

Beads, a variety of personal ornament, made of glass, pottery, metal, bone, ivory, wood, jet, amber, coral, &c., and perforated so that they can be strung on threads and made into necklaces, bracelets, rosaries, &c., or worked on cloth as a kind of embroidery. Their use is of great antiquity, for they are found in the most ancient of the Egyptian tombs as decorations of the dead; and beads supposed to have been used in barter by the Phœnicians in trading with various nations in Africa are still found in considerable numbers, and are highly valued by the natives under the name of 'Aggry' beads. The origin of the name is unknown; but the coloured or variegated glass beads denoted by it are unquestionably of ancient manufacture; they are sometimes sold for more than their weight in gold. Ever since the 14th century, the manufacture of glass beads has been chiefly engrossed by the Venetians, and the glass manufacturers of Murano retain in large measure their ancient monopoly. Birmingham is the chief seat of the manufacture in England. The manufacture is curious: the melted glass, coloured or uncoloured, is taken from the pot by two workmen, who slightly expand the *gathering* of glass on the end of their blowing tubes. Each man then opens the hollow bulb of glass attached to his tube, and the two bulbs, while still soft and highly heated, are joined into one. This done, they walk rapidly away from each other in opposite directions, in a long shed like a small rope walk, and draw the glass, which retains its tubular character given by the blowing, &c., into rods of great length, and often extremely small diameter. On cooling, which takes place very quickly, these long rods are broken up into short lengths of about a foot, and a small number of these shorter rods are placed on a sharp cutting edge, after being annealed, and are chopped into lengths. The roughly cut beads are next placed in an iron drum containing a mixture of plaster and charcoal dust. The drum is placed in or over a furnace, and a rotatory movement given to it. By this operation the short bits of tubes or perforated canes, which are softened by the heat, become rounded. The plaster and charcoal prevent the beads sticking together while soft. The beauty and infinite variety of Venetian glass beads are quite wonderful. They are sent to almost all parts of the world, but especially to African ports for the purposes of barter in the interior.

In Old English, *bede* signified 'a prayer,' and hence came to mean the small perforated balls of gold, silver, glass, ivory, or hard-wood, used for keeping account of the number of prayers repeated. This curious transfer of the name from that which is counted to that which is used to count them, finds its exact parallel in 'punish, where *count*, 'a bead,' is from *count*, 'to count.' The old phrase 'to bid one's beads' means simply 'to say one's prayers;' and the modern phrase 'to tell one's beads,' literally 'to number one's prayers,' now means simply 'to say one's prayers.' A certain number of such beads strung on a thread makes a Rosary (q.v.). A *bedesman* or *bedeswoman* is one who prays for another. Persons of station and wealth in old times had regularly appointed *bedesmen*, who were paid to pray Heaven with their supplications. *Bedesmen* frequently lived together in hospitals, and joined prayers for their founders and benefactors, and hence *bedchouse* is synonymous with an almshouse. In King's *Bedesmen* in Scotland were licensed mendicants (see BLUE-GOWNS). A common form

of signature at one time was: 'Your bounden bedesman,' or 'Your humble bedeswoman,' instead of the modern 'Your obedient servant.'

Beagle (probably from Fr. *béguenle*, 'wide-throat'), the smallest variety of hound, formerly much used in England for hare hunting. It has now been almost wholly superseded by the Harrier (q.v.), to which its name is sometimes given. The true beagle is smaller than the harrier, ranging from 10 to 15 inches in height at the shoulder (below which height it is difficult to obtain well-developed specimens), stout and compact in make, with long pendulous ears, smooth-haired, sometimes dark brown, with a streak or spot of white about the neck, but generally marked in the same way as foxhounds or harriers. The beagle is prized for its keen scent and perseverance; and although much distanced by the hare at first, it is almost sure to kill it. It was customary in England, in former times, when beagles were used, to follow the chase on foot, a hunting pole being employed to assist in leaping. The cry of the beagle during the chase has been regarded as particularly musical. The smaller breeds, though extremely delicate animals to rear, were preferred, at first, perhaps, for the prolongation of the chase; and the diminutive size of a pack or 'cry' of beagles became a boast. See DOG.

Beak. See BILL.

Beale, LIONEL SMITH, a distinguished physician and physiologist, born in London in 1828, studied medicine at King's College, where he afterwards became professor. Besides the usual professional distinction, he is F.R.S., and a member of scientific societies in Sweden, New York, Italy, and Belgium. He has made numberless contributions to the *Lancet* and other special journals, and has written books of great value on microscopy, kidney diseases, urinary deposits, the distribution of nerve to voluntary muscle, the structure and growth of the tissues. More important still are his *Protoplasm, or Life, Force, and Matter* (1870); *Life Theories, their Influence upon Religious Thought* (1871); *Life and Vital Action in Health and Disease* (1875); *Principles and Practice of Medicine in Slight Affections* (1880).

Beam (A.S. *beām*, 'a tree'), any piece of wood, long like a tree. In the arts, the word has many special technical applications. It is the name, for instance, for part of a weaving-loom, of a balance, and of a stationary steam-engine. Beam in engineering is a strong stay of wood or of iron, for supporting lateral pressure. In ship-building it is applied to any of the transverse pieces of framing extending across the hull. In ship measurement it means breadth at the wales (see TONNAGE). The position of the beams, stretching across a ship at right angles to the keel, has given origin to many technical phrases used on shipboard. 'On the starboard beam' is applied to any distant point out at sea, at right angles to the keel, and on the starboard or right hand—as viewed from the stern—side of the ship. 'On the port beam' similarly applies to the left hand. 'On the weather beam' is that side of the ship which receives or is towards the wind. 'Before the beam' is the bearing of any object when seen more in advance than *on* the beam. 'Aft the beam' is the reverse of the expression just noted. 'On her beam-ends' is applied to the position of a ship when so much inclined to one side that the beams become nearly vertical.

Beaming is the art of winding the web on the weaver's beam in a manner suitable for weaving with regard to firmness and evenness. It is to some extent a special employment, followed by workmen trained as beamers. See WEAVING.

Beam-tree, WHITE (*Pyrus aria*, see PYRUS), a tree of 20-40 feet in height, a native of almost all parts of Europe and of corresponding climates in Asia, not uncommon in the mountainous districts of Britain, and frequently planted. It has been variously referred by botanists to several allied genera *Sorbus*, *Crataegus*, and *Mespilus*. It has a straight erect trunk, and a round or oval head; the leaves are ovate, cut and serrated (in some varieties deeply lobed), white and downy beneath; the flowers in large terminal corymbs; the fruit scarlet, of the size of small peas. The fruit is acid and astringent, but becomes agreeable when in a state of incipient decay; it is sometimes called Sorb or Service-berry, and resembles the true Service (q.v.) in quality, although much smaller. Beer is made of it by fermentation, and by distillation it yields a powerful spirit. The wood is very hard, and of a fine close grain, yellowish white, but easily stained, and capable of taking a high polish. It is much used in turnery in making handles to knives and forks, wooden spoons, parts of various musical instruments, and cogs for the wheels of machinery.

Bean is a term used to designate the seeds of various plants, but in England is generally applied to those of different species belonging to the natural order Leguminosae, as, for instance, the Common Bean (*Faba vulgaris*), the French, Kidney, or Haricot Bean (*Phaseolus vulgaris*), the Molinea Bean (*Gaiardina bonducella*), the Locust Bean (*Ceratonia siliqua*), the Tonka Bean (*Dipteris odorata*), and others. The term is also applied to the seeds of other plants widely different from each other and from the Leguminosae. Of these the Pitchurim Bean, the seed lobes of *Nectandra puchury*, a relative of the Cinnamon and a native of tropical South America; St Ignatius' Bean, the seed of *Ignatia amara*, closely allied to *Strophos* (q.v.), the source of strychnia, and itself strongly impregnated with the deadly qualities of that drug; the Egyptian or Sacred Bean, the seed of *Nelumbium speciosum*, an aquatic plant held in veneration by eastern peoples; and the remarkable Calabar Bean (q.v.). *Phaseolus venenosus*, are a few of the many instances of plants whose seeds are popularly designated beans.

The common bean is a valuable source of food to man and animals in most of the temperate climates of the globe. It is of eastern origin, and was cultivated by the Egyptians, the Greeks, and the Romans, who introduced it into Britain. The varieties are numerous, several of them being adapted to field cultivation. It is only used as human food in this country in the green or unripe state, but the ripe beans are valuable as food for pigs, horses, and cattle. The Greeks and Romans looked upon it as in some respects a sacred plant; in the Roman festival of Lemuralia (see LEMURES) the father of the family threw black beans over his head, repeating certain traditional words. Pythagoras forbade his disciples to eat beans. Beans were used by the ancient Greeks and others in voting by ballot, and a survival of this custom has lingered in the election of kings and queens at Twelfth Night and other feasts.

Beans of the ordinary kind belong to one species, *Faba vulgaris*, natural order Leguminosae. The common field varieties are the Tick Bean, the Scotch Horse Bean, the White Cluster, the Chat-teris, and the Winter Bean. The garden sorts (other than French beans) are large, such as Longpods and Windsors, and are generally known as 'broad beans'—the proverbial 'beans and bacon,' used as food, especially by the poorer classes in England. Beans grow best on the heavier classes of soils, and are usually planted after wheat or some other grain crop. The most com-

mon method of preparing the land is to plough in farm-yard manure early in autumn. The common concentrated manures, other than potash, give as a rule poor results. The seed, 2 bushels to 2½ bushels per acre, may then be drilled, or sowing may be delayed till February, when the land is found to be mellowed by the winter frosts; 3 bushels to 3½ bushels of seed is then required of some spring-sown variety; 3 inches is a good depth for winter planting, and 2 inches in spring; 18 inches is a convenient distance between the rows, allowing space for thorough horse-hoeing and hand-hoeing, which is necessary, as the bean is a dirty crop. Beans may be broadcast and covered easily by harrowing, but the system, although simple, is objectionable, because the land cannot be properly cleaned when the crop is growing, and rather more seed is necessary. Sowing may be done every second furrow while the land is being ploughed, by means of Reeve's patent sower attached to the plough. This system is well suited to planting beans in autumn on land being broken up from grass. Autumn-sown beans grow the heaviest crop, if they escape severe winter frosts or frequent sudden change of temperature, which is apt to kill them; they are also ready to harvest in England with the wheat-crop, and can be cut without injury in bad weather during harvest, which is a great convenience, as well as a saving of expense. Spring-sown beans are rather later in coming to maturity, which means in England dead ripe. In Scotland, beans are cut at an earlier stage, as the straw is at times used for horse fodder, being usually chopped and mixed with hay or oat straw. Ripened beans are ground into bean meal, used as food for horses and cattle, and sometimes made into coarse bread. Beans take longer to dry after being put into shock than cereal crops, but are not so easily injured by bad weather; they are stacked in the same way as wheat, openings being left through the stacks for ventilation, to prevent moulding and injury to the seed. Beans are liable to be attacked by mildew when grown under unfavourable circumstances. At times a fungus appears in the form of discoloured patches on the leaves and pods. If these diseases are largely developed, the crop is best ploughed down as a green manure after being laid by rolling. The most serious insect enemy is the *Bean aphid* or Black Dolphin, which begins near the top of the plant, and multiplying into myriads, covers and destroys it. If taken in time, the crop may be saved by cutting off the tops; if not, it has to be eaten off green by sheep, or if not required for food, it may be ploughed in. The humble-bee pierces through at the base of the flower to reach the honey, but this is not now thought to be injurious.

The French Bean (*Phaseolus vulgaris*) and the Scarlet Runner (*P. coccineus*) are grown in most English gardens, and the pods eaten as vegetables. They should be grown on rich land in a fine tilth state; fresh manure is injurious to them. The runners, being hurdy, are sown towards the end of April in rows 2½ to 3 feet apart; French Beans being delicate, are not sown till June, when frost is gone. The runners, if the tops are nipped off the vines in June, continue to yield until autumn frosts set in; French beans go off much earlier.

The beans grown in the United States are for the most part either haricots or closely allied kinds.

Bean-caper, a name applied to *Zygophyllum fabago*, whose flower-buds are used in the East as a substitute for capers.

Bean Feast is a name for an annual dinner given by employers to their workpeople—possibly so called because beans or a bean-goose figure prominently in the repast.

Bean Goose. See GOOSE.

Bean King's Festival. See TWELFTH DAY.

Bear (*Ursus*), a genus of large mammals in the order Carnivora. They differ from the related cat and dog types in being much less markedly carnivorous in habit and structure.

General Characters. The stout body with thick legs and very short tail is covered with long shaggy fur; the entire under surfaces of the naked palms and soles rest on the ground in what is termed plantigrade fashion; the long claws are comparatively blunt, and are not retractile; the more or less elongated head, with short rounded hairy ears, runs out into a blunt somewhat hog-like snout; the bony external ear-bulb (tympanic bulla), so conspicuous on the skulls of most carnivores, is here rudimentary; the teeth have the same number and arrangement as those of the dog, but in association with the omnivorous and largely vegetarian diet the canines remain less developed, the special cutting teeth (sectorials) less sharp, and the molars have flattened and tuberculated grinding surfaces. Compared with the higher carnivores, bears are slow and less aggressive, relying more upon strength than cunning, and more or less contented with vegetable food. Though clumsy and heavy animals, they are thoroughly active, and some of them swim and climb with much agility. Most of them sleep through the winter, when their food is usually scarce, and it is at this season that the young cubs are born.

History. In the earlier ages of civilisation bears bulked much more largely both in the imaginative and the practical life of men. In Greece the bear was king of the woods and sacred to Diana, though none the less a favourite object of the chase. He is a prominent figure in the mythologies and herstories of Northern Europe; and the same mixed reverence for a formidable antagonist is exhibited still by the North American Indians, who excuse themselves for eating it by an elaborate preface of compliment and respect. Bears used to be common beasts of chase in Europe, as many personal and local names abundantly testify. Large numbers were imported to Rome from various quarters, especially towards the decline of the empire, and supplied abundant material for the cruel conflicts of the amphitheatres. It is indeed on record that as many as a thousand bears were on one occasion exhibited. Bear-baiting prevailed to a much later date, and even in the time of Queen Elizabeth and her successor it was a recognised fashionable amusement to go to the bear-gardens, and see the victims worried to death by dogs. The name *Brüin* playfully given to bears is derived from the old poem *Reginald the Fox* (q.v.), where the bear has the name of 'Brown'; 'brüin' being the Dutch spelling of 'brown.'

Distribution.—The genus, though not a large one, is widely distributed in cold and temperate regions, and in the secluded uplands of some warmer countries. About ten species frequent various parts of Europe, Asia, and North America, while the African Bear (*Ursus crothori*) of the Atlas Mountains, and the South American Spectacled Bear (*U. ornatus*) of the Andes are the only two representatives known to occur on these two continents. Their geographical range has been gradually becoming more and more restricted.

From the Pliocene strata of Europe and the deposits of the Sivalik Hills, two extinct species of bear have been discovered (*U. arverensis* and *U. etruscus*). The Post-pliocene European caves are rich in remains of the Great Cave-bear (*U. spelæus*), along with those of the still abundant Grizzly. None of the above extinct forms differ markedly from existing species, but related genera

like *Arctotherium* and *Hyamaretos* lead back to such a primitive form as *Amphigenia*, which is supposed to be at the converging point of the dog and bear family lines.

Different Forms. The common Brown Bear (*Ursus arctos*), a variable species, inhabiting Europe and Asia, and regarded by some as identical with the black bear of North America. It used to be



Common Brown Bear (*U. arctos*).

found in Britain, but seems to have been exterminated in Scotland about the end of the 11th century. It measures about 6 feet in length, and stands 3 feet or so high at the shoulders. The long fur is predominantly dark brown, but very variable in colour. They eat all sorts of things—roots, berries, vegetables, ants, honey, fish, &c., and when these fail, other quadrupeds both small and large. The males and females only meet at pairing time, and the males are said to be more inclined to eat the cubs than in any way to care for them. The mother bear, on the other hand, is devotedly fond of her offspring, is ready to defend them at all costs, and when in their company is a most dangerous animal. In spite of the shuffling awkward gait, the brown bears are agile animals, climbing and swimming with ease, and able to attain a considerable speed in running. Their senses of smell and hearing are very acute. When hunger prompts them to attack large quadrupeds, their usual method is to hug their prey to death within their powerful arms. At the beginning of winter, when food is becoming scarce, but before the bear has had time to get out of condition, it seeks some sheltered nook in a cave or hollow tree, and after making itself snug and comfortable, falls into a winter sleep. During winter the female gives birth to from one to three cubs, which are cherished in the lair until spring. They remain blind for about a month, and are suckled for other two. When the bears reappear after their long rest they are thin and weak, and not unnaturally voracious. They attain a considerable longevity of 40 to 50 years. When kept in captivity they seem apt to sink into a phlegmatic mood, to which they appear to have a natural predisposition; they may, however, be taught to dance clumsily on their broad soles, and are said to have a good ear for music. Numerous stories are told, moreover, of their affectionate disposition when properly treated, though they are generally sour and crossed by confinement. The skins are greatly valued, the flesh of the cubs is very palatable, bears' paws form a

special delicacy, and the fat or bear's grease is a well-known unguent. In Kamchatka, different parts of the bear, which is very common, are used in a great variety of ways—e.g. the intestines for window-panes.

The American Black Bear (*Ursus americanus*) is regarded by some as merely a variety of the former, from which it differs only in a few trivial characters, such as blacker fur, more slender snout, more convex forehead, and the like. It inhabits North America, is even more thoroughly vegetarian than the Eurasian form, and much less dangerous than the Grizzly. If food be abundant in the late autumn, and the bears in consequence in good condition, they fall into a winter sleep in an often snow covered hiding-place. They are revered or almost worshipped, but at the same time hunted and eaten by the Indians. The skins are largely utilised for caps, rugs, &c., and value from £1 to £3. Closely related to the above forms are the Syrian Bear of Lebanon and the Palestine mountains, and the Indian White Bear of the Himalayas. The former species (*U. syriacus*) is repeatedly mentioned in the Bible, and was much used in the Roman exhibitions. The Himalayan Bear (*U. isabellinus*) is probably only a variety.

Quite distinct from the above is the Grizzly Bear (*U. horribilis*, *circensis*, or *ferus*) of North America (from Mexico to 61° N.), a very large, strong, and fierce animal, chiefly at home on the Rocky Mountains. Though the characteristics of this powerful species are well marked, it was not till the explorations of Lewis and Clarke in 1802-6 that it was known to be a distinct type. The dark brown fur has a good deal of gray about the head, the ears are short and conical, the forehead broad and flat, the tail extremely short, the claws long, curved, and whitish. The adult Grizzly cannot climb trees. It is larger and stouter than the brown bear, more markedly carnivorous, and a very much more formidable beast of chase. It is said to be able to drag a buffalo carcass along, and is by far the most ferocious of bears. Attacked by man, it will pursue the assailant till the last. It is extraordinarily tenacious of life. A case is authenticated of a Grizzly receiving ten balls in its body, four of which passed through its lungs and two through its heart; it nevertheless swam half a mile, and did not succumb for twenty minutes. The skin is less valuable than that of the brown and black bears. The Indian or Tibetan Black Bear (*U. tibetanus*) and the Japanese species (*U. japonicus*) do not differ markedly from any of the preceding.

Somewhat different from the bears above described are a few forms for which separate genera are often erected. The Malayan Sun Bear (*Helarctos* or *Ursus malayanus*), inhabiting the Malay Archipelago, has a short, broad head, long extensile tongue, short, smooth, black fur, and remarkably long claws. Its maximum length is about 4½ feet. It does great damage to the coconut plantations. The Sloth Bear (*Melursus* or *Ursus labiatus*), which is still more divergent, inhabits the mountainous regions of Southern Asia and Ceylon. The first upper front tooth is absent or shed very early, and the other teeth are very small. Sloth bears are clumsy, ungainly animals, 5 to 6 feet long, with shaggy black fur, and with prolonged snout and lips which are utilised in sucking white ants out of their nests. They are for the most part contented with insects, honey, and vegetables, but often do considerable damage to the plantations. They admit of being readily tamed, and are often led about by Indian jugglers. The Spectacled Bear of the Peruvian and Chilean Andes (*Tremarctos* or *Ursus ornatus*) is a small form about 3½ feet long, with black fur, and

curious light-coloured rings round the eyes. A closely related species inhabits the island of Formosa.

The Polar or White Bear of the Arctic regions (over the whole Polar zone) (*Thalassarcos* or *Ursus maritimus*) has a comparatively narrow head, a pointed snout, small rounded ears, and a long neck.



Polar Bear (*Ursus maritimus*).

The grinding teeth are smaller and narrower than usual, and the soles of the feet more hairy. They feed principally on fish and seals, rarely attacking terrestrial quadrupeds, and not despising vegetable food in summer. They are the largest bears, often measuring 9 feet in length, and are proportionately strong. They move heavily, but not slowly over the ice, and are able to swim with much swiftness and endurance. They are more aquatic than any of the other species. Tales of polar explorations seem to show that the white bear is more aggressive towards man than any of the other species, and it is certainly the most carnivorous type. As food is abundant in winter, the males at least do not seem to hibernate. The she-bears, however, find sheltered nooks in the autumn, and bear one to three cubs in midwinter. The dwellers in the far north are fond of hunting the polar bear, and use the flesh for food, the fat for tanning and curative purposes, the sinews as twine, and the skin for clothing. The genus *Adurquus* is of some importance as a connecting link between the bears proper and other carnivores like the Panda (q.v.). See CARNIVORA.

Bear, BERE, or BEER. See BARLEY.

Bear, GREAT and LITTLE. See URS A MAJOR and MINOR.

Bear-baiting. In different countries bears were formerly made objects of cruel sport, by being baited with dogs. In England it was a favourite amusement as early as the reign of Henry whilst at a later period a 'royal bear-ward' officer regularly attached to the royal household. The sport is frequently alluded to by Shak and Ben Jonson, and it was not only once by Queen Elizabeth, but it was placed upon particular patronage of her majesty. An order of the Privy-council, in July 1591, prohibited performance of plays on Thursdays, because Thursdays bear-baiting and the like pastimes had been usually practised; and an injunction to the same effect was sent to the Lord Mayor of London, in which it is stated 'that in divers places the players to recite their plays to the great hurt and dishonour of the church, and the like pastimes are maintained for her majesty's pleasure.' The queen's bears were kept at the Paris

even
to use
some-
which
The
dens

Bankside, Southwark, close to the river, named after Robert de Paris, a nobleman of the time of Richard II. Every town of importance at that time kept its bear, bear-ward, and pack of dogs. It is hardly necessary to add that bear-baiting, like bull and badger baiting, has long been unknown in England, having been prohibited by parliament in 1835.

Bearberry. The RED BEARBERRY (*Arctostaphylos uva-ursi*) is a small trailing evergreen shrub, common in the Highlands of Scotland and in the Hebrides, and ranging over the northern parts of Europe, Siberia, and North America. It grows in dry, heathy, and rocky places. The flowers are in small crowded terminal racemes, of a beautiful rose colour. The berries are austere and mealy; they are said to be largely eaten by bears in northern regions. Grouse also feed on them. The dried leaves are used as an astringent and tonic medicine, especially in chronic affections of the bladder; but those of the Cowberry (*Vaccinium vitis-idaea*) are substituted for them. The BLACK BEARBERRY (*A. alpina*), of similar distribution, is a small trailing shrub, with black berries about the size of a sloe, which are relished by some.

Beard. The hair of the beard, moustache, and whiskers, is usually, though not always, of the same colour as the hair of the head, but somewhat shorter, stronger, and more wiry; it is invariably the colour of the hair on the eyebrows. The beard is the distinctive sign of manhood. In women, an incipient beard sometimes appears in the later years of life. Instances also occur of women with a beard almost equal to that of the male sex, the most celebrated 'bearded lady' being Margaret of Parma, regent of the Netherlands (1559). The beard is generally luxuriant in persons of the Slavonic and Celtic races. The aborigines of America, who are naturally almost beardless, make themselves entirely so by plucking out the hairs of the beard. In early times the beard was considered by almost all nations a sign of strength and an ornament of manhood, was carefully cherished, and even regarded as sacred. Among the Turks, Arabs, Persians, and many other nations, the removal of the beard was, and is yet to a very great extent, regarded as a severe punishment, and an extreme degradation. The Moslems, who are accustomed to swear by the beard of the prophet and by their own, carry combs constantly about with them for the purpose of dressing the beard. It is common to do so immediately after prayers, the devotee remaining on his knees during the operation. The hairs that fall out are then carefully picked up and preserved for entombment with their owner when he dies; frequently he himself deposits them beforehand in his destined tomb. The ancient Jews did not dye their beards, but the practice was common among the Arabs and Persians. The Arabs dyed the beard red, not only because dye of that colour (being merely a paste of henna leaves) was easily obtainable, but because it was an approximation to golden yellow, the colour recommended by their prophet Mohammed, who hated black, the colour the Persians preferred. The red beards of some of the suite of the sultan of Zanzibar caused no little surprise on the occasion of his visit to England in 1875. The Persian kings are said to have interwoven their beards with gold thread. It is customary among the Turks to anoint the beard with perfume, and to smoke it with incense. The Jews also anointed their beards. The Moslems commonly clipped their whiskers, the Jews did not. The Egyptians shaved their beards except in time of mourning, when they let them grow. They sometimes, however, wore false beards of plaited hair, varying in form and length with the rank of

the wearer. In Greece the beard was universally worn till the time of Alexander the Great, who ordered shaving, that the beards of his soldiers might not be laid hold of by their enemies in battle. Shaving was introduced among the Romans about 300 B.C. Pliny says Scipio Africanus was the first Roman who shaved every day. Subsequently, the first day of shaving was regarded by the Romans as the entrance upon manhood, and celebrated with great festivities. Under Hadrian, the beard was again allowed to grow, and this fashion prevailed till the time of Constantine the Great, when it was discontinued. Amongst the ancient West Goths and Burgundians, the removal of the beard was a sign of servitude, or loss of honour; nobles wore long beards. In the time of Charlemagne, the upper classes wore at most a moustache, while the common people cherished a full beard. The wearing of the beard, shorter or longer, was usual amongst the gentry from the 10th till the 12th century; subsequently throughout the middle ages the higher ranks shaved closely. Peter the Great compelled shaving in Russia by imposing a heavy tax upon the beard, and further, by having the beards of all whom he found wearing them plucked out by the roots, or shaved with a blunt razor. The beard was commonly worn in France till the time of Louis XIII., when, because the monarch was young and beardless, the fashion changed at the court and throughout the kingdom. A similar change took place in Spain on the accession of Philip V. The English wore beards for a considerable time after their invasion of Britain; and the beard appears to have been general among the people at the time of the Norman Conquest. But the Normans not only shaved themselves, but compelled the conquered to do so likewise; and many of the English chose rather to leave the country. It would appear, however, from sculptures on the tombs of kings and nobles, that not very long after the Conquest some of the Normans adopted the custom they had prohibited among the vanquished. Edward III. is represented on his tomb in Westminster Abbey with a very long beard. In the time of Elizabeth, beards were of the most varied and fantastic cut; and Taylor the 'Water-poet' satirises the extravagance of beards prevailing in that and the succeeding reign.

Under Charles I. were worn the moustache and peaked beard, familiar through Vandyke's portraits; in Charles II.'s reign moustaches only were worn; and the practice of shaving the whole face soon became general all over Europe. Among the clergy, too, there has been great diversity in the matter of beard wearing at different times and in different countries. One is apt to associate the beards of the reformers with their Protestant tenets; but, as a matter of fact, all the popes were bearded from 1523 to 1691. Nowadays the clergy of the Eastern Church go bearded; of the Western, closely shaven. In the Anglican Church many of the inferior clergy have long worn beards; but Bishop Ryle of Liverpool (1880) was the first bearded prelate for many a day. The Worcestershire militia claims to have been the first English regiment to adopt the moustache, in 1798, and to have borrowed the idea from the Austrian service. The growth of the full beard dates in France from the capture of Algiers (1830), in England from the Crimean war (1855). In France during the second empire, moustache and 'imperial' after the manner of Napoleon III. were usual. For a good while a beard was regarded by some of the continental governments as a badge significant of democratic sentiments, and as such was interfered with by police regulations. Certain nations, such as Poles and Hungarians, usually grow only moustaches. Side-whiskers were long an especially English

characteristic. Of late the tendency is to leave the individual to choose what particular portion of his face he will shave or leave *à l'état naturel*. Physicians recommend that the beard should be allowed to grow on the chin and throat in cases of liability to inflammation of the larynx or of the bronchiæ; and moustaches and whiskers are reckoned useful for prevention of toothaches and nervous diseases of the face. The beard is itself liable to the same diseases as the hair of the head, and to a peculiar disease (*mentagra*) occasioned or kept up by shaving, and consisting in a bark like exudation from the inflamed sebaceous glands of the hair. See **BARBER, HAIR**.

Beard. GEORGE MILLER, an American physician, born May 8, 1839, in Connecticut, studied at Andover and Yale, and served during the war as an assistant-surgeon in the navy. In 1866 he settled in New York as a specialist in nervous diseases, on which he lectured for some years at the university. Besides suggestive books on eating and drinking, stimulants and narcotics, hay fever, sea-sickness, and sexual neurasthenia, Beard produced a valuable work on *American Nervousness* (1881), basing his results on the climate and mode of life in America. He died in New York, January 23, 1883.

Beard Moss. See **USNEA, BROMELIACEÆ**.

Bearer Company. an organisation for removing wounded soldiers from the field of battle to the dressing station or temporary hospital which is part of the equipment of the Bearer Company, and where first-aid can be given to them. The Bearer Company was first introduced into the British army in 1873, and comprises the following: 8 medical and 1 transport officers, 3 other officers for discipline and supply duties, 36 non-commissioned officers and men, who are trained sick-bearers of the Medical Staff Corps, 95 attendant untrained bearers from the Militia Reserve (q.v.), 11 Bâtnen (q.v.), and 47 drivers of the Army Service Corps. The uniform is blue with red piping, spiked helmet, and brown leather belt. Tents for the personnel and for the dressing stations are carried in 2 general service (transport) wagons, and a Bearer Company also has 33 Ambulances (q.v.), two surgery wagons, 2 equipment, 1 supply, and 3 water carts, requiring 109 horses. A modified organisation has been laid down for mountain warfare, consisting of 112 mules, of which 36 carry equipment, and 76 carry patients in cacolets or litters. One muleteer is allowed for every animal if they are untrained, and if trained, one to each pair of mules. Half a Bearer Company is attached to each Army Corps (q.v.) on active service, forming the link between the battalion stretcher-bearers and the field-hospitals.

Bearing. of a ship at sea, is the direction in which she sails, in reference to the points of the compass. On shipboard, seamen often conveniently refer the bearing of another ship or of an object on shore, not to the points of the compass, but to the line followed at the moment by their own ship's keel. Thus the bearing of the distant object may be *ahead, astern, on the starboard bow, on the port quarter*, &c.

Bear Lake. GREAT, in the north-west of Canada, in 65° 67' N. lat., and 117° 123' W. long., is the most northerly of that series of fresh-water seas—Huron, Superior, Winnipeg, Athabasca, Great Slave, Great Bear—which mark a continuous depression in the middle of the continent. Lying 246 feet above sea-level, Great Bear Lake is irregular in shape, with a surface estimated at 701 sq. m., or not much smaller than Wales. It sends forth a river of its own name to the

Mackenzie. As the Arctic circle passes over it, the climate is severe.

Bear-leader. In former times, bears were led about with a chain, muzzled, and made to dance or stand on their hind-legs for popular entertainment; small dancing-dogs being usually added, for the sake of attractiveness. From this old practice, which is not yet quite extinct, has been taken the phrase 'bear-leader,' used jocularly to signify a discreet person who takes charge of a youth of rank on his travels to see the world.

Bearn. formerly one of the thirty-two provinces into which France was divided, and now forming the greatest portion of the department of Basses-Pyrénées. The inhabitants are chiefly Gascons with a strong infusion of Basque blood, and they speak the purest Gascon dialect. Bearn was a portion of Aquitania under the Romans, and after the downfall of that empire, under its ruling dukes it was a country of considerable importance. From the intermarriage of the ruling family, the Counts of Foix, with that of Navarre, sprang the French monarch Henry IV., who, because he was born and brought up in Bearn, was derisively called *Le Béarnois*. When he ascended the throne of France, Bearn, of course, virtually became a part of that country; but was only formally incorporated with it in 1620 by Louis XIII. See RIVEROZ, *Chansons et Airs populaires de Béarn* (1841); Bourdeau, *Ancienne Gascogne et Béarn* (2 vols. 1861-62); Cénac-Moncaut, *Histoire des Peuples Pyrénéens* (3d ed. 4 vols. 1874); and Lespy, *Grammaire Béarnaise* (2d ed. 1880).

Bear River. a stream of Utah, U.S., which rises in the Rocky Mountains to the E. of Salt Lake, flows NW. into Idaho, then bends round and again returns into Utah, falling into Great Salt Lake. The Bear and Steamboat springs on its banks, in Idaho, are impregnated with magnesia and other minerals. Coal is found at the crossing of the Central Pacific Railroad.

Bear's Grease. Under this name there are sold pomades, represented to be of great efficacy in nourishing and promoting the growth of hair. These so-called preparations of bear's grease are for the most part composed of purified beef-marrow, hog's-lard, or fat of veal, and spermaceti, along with almond oil, and some scenting ingredients. See **HAIR**.

Beas. an Indian stream, one of the 'Five Rivers' of the Punjab, rises in the Snowy Mountains of Kulu, at an altitude of 13,320 feet above sea-level. It flows through the Kangra Valley, and generally SW., to the plains of the Punjab, where it joins the Sutlej some 30 miles above Ferozpur, after a course of 290 miles.

Beast. NUMBER OF THE. See **APOCALYPTIC NUMBER**.

Beast-fables. stories in which animals play human parts, a widely-spread primitive form of literature, often surviving in more or less developed forms in the more advanced civilisations. A better example of its simplest form could be found than those stories of the negroes within the Southern States of America, which, through Harriet Beecher Stowe's *Uncle Remus*, are now so well known to the reading public in England as well as America. The primitive natives of many parts of Africa still tell stories similar to these, and indeed they have acquired no very exalted notions of the inferiority of the human race, and admit without difficulty that the wisdom of the lower animals may be equal to their own. 'It is not little curious,' says Sayce, 'to find that the chief home of the beast-fable should be Africa, and especially those backward tribes of Southern Africa whose

languages contain in their clicks the bridge that marks the passage of inarticulate cries into articulate speech. It seems as if the same conservatism which has preserved the animal sounds out of which language was developed, has preserved also a sympathy with the animal world, a memory of the close ties which unite us with it. A striking instance of the naturalness of this form to the negro mind is seen in the fact that when the Vãi tribe of Mandeng-negroes in Liberia had developed a system of writing (1830-40), their first essays in composition were rude fables about beasts. Even in the advanced civilisation of ancient Egypt, the beast-fable held an important place; indeed, it is not improbable that here it may have made its first appearance, and that its popularity may have been in large measure due to the deep respect of the ancient Egyptian for the unerring instinct of animals, which went side by side with the animal-worship that was so marked a characteristic of his religion. We find the 'Lion and the Mouse' in a papyrus dating from 1200-1166 B.C.—the days of Rameses III. (Rhampsinitus) or Hak On: not as a rude and early attempt, but in a finished form postulating a much more ancient origin. Sir Richard Burton points out that from Kemi; the Black-land, it was but a step to Phœnicia, Judæa, Phrygia, and Asia Minor, whence a ferry led over to Greece. Here the apologue found its populariser in Aisôpos, whose name, involved in myth, possibly connects with Aithiops. The fabulist's era may be taken as contemporary with Solon (570 B.C.), about a century after Psammetichus (Psamethik I.) threw Egypt open to the restless Greek. From Africa, too, the fable would spread eastwards, and find a new home in the second great focus of civilisation in the Tigris-Euphrates Valley; while in later days the conquests of Alexander and his successors Hellenised the eastern world, and carried with their victorious arms every form of literature that had been fostered by the western peoples. Whether or no we can accept this historical chain as explaining the transmission of the beast-fable, at least it must be admitted that it is highly reasonable as a theory, and finds here and there strange verification. Even the Lokman of Arabian and Persian fable has a more than superficial likeness to the Æsop of history in his ugliness and his servile condition.

To us the allegory in such fictions seems fundamental, but it was not so to the primitive mind. To the savage the beast-fable is not nonsense, for he ascribes to the lower animals the power of speech and a nature resembling his own, and believes readily in transmigration and metamorphosis. Savage mythology is full of metamorphoses, and these happen still as contemporary events in Siam and Sarawak. The belief in the affinity between man and animals in which primitive man has so nearly anticipated the would-be conclusions of certain advanced evolutionists belongs even now to half mankind, and most students of comparative religion maintain that in the other half the worship of animals represented a earlier stage in the religious evolution. The Australians, Kamchadales, Polynesians, North-American Indians, Basques, and Transylvanian Gipsies at the present day tell beast-fables into which as yet no moral lesson has entered. They have not yet reached the stage which Grimm, with contempt of the true folklorist, describes as 'the thinned-down to mere moral and allegory,' and a fourth watering of the old grapes of an inspired moral infusion. Among the Zulus and Hottentots we find the same stories, informed with the true Æsopic humor. Indeed it is, as has been seen, among the Bushmen, that pure beast-fables still exist in their simplest and fullest form, and it

is among them also that the art of drawing animals with considerable skill has been cultivated from time immemorial, as is evidenced by the rock-paintings of Southern Africa. In the Bushmen's beast-fables, the hare, as among the American negroes, the rabbit, plays much the same clever part as the fox in our European examples, and fables that illustrate the superior cunning of the hare can be traced, says Sayce, 'from the Bari of Central Africa through Malagasy, Swahili, Kafir, and Hottentot, back to the Bushmen, where he is associated with what Dr Bleek calls "a most unpronounceable click," not otherwise found in the language.' But indeed we find the beast-fable in all parts of the world. Thus in Mr Gill's *Myths and Songs from the South Pacific*, a shark speaks and acts like a man, and Mr Ridley tells us the Australians ascribe human speech and action to the pelican and the musk-duck. The question need not now be raised whether these fables are really an indigenous native literature: it is sufficiently striking and significant to find here stories almost identical with those found among widely different people in widely distant regions. In our civilised world the animal-story lingered long after the moral beast-fable had become predominant. The crows of Æsop had croaked their wisdom through the medium of Babrius and Phædrus for a thousand years before the genuine beast-epic reached its highest development in *Regnard the Fox* (q.v.), belonging to the 12th century, but containing materials of a far earlier date. It is not a didactic poem, nor essentially even a satirical poem. Its charm lies in the admirable manner in which the characters of the various animals are sustained. Its influence in the middle ages may be partly understood from the fact that our common names *Regnard*, *Beauclerc*, and *Chanticleer* were originally the names of the characters in the great beast-fable.

Beast-fables, resembling more particularly the African, have been found in the cuneiform inscriptions of Babylonia. Four excellent examples have been preserved among the fragmentary records of Assarbanipal's library: the first narrating the actions of an eagle and a serpent; the second, of a fox and jackal; the third gives a discussion between a horse and an ox; while in the fourth a calf speaks. Jotham's story in the Book of Judges makes the trees talk to one another. So in the Izdubar legends of Babylonia, the trees answer Heabani.

Stories of the same nature are equally common farther east in Asia. Perhaps no book has been more widely popular than the fables of Bidpai (q.v.), translated first into Pehlevi or ancient Persian from an old Indian original, in part represented now by the Panchatantra (q.v.). The Indian fables differ from the Æsopic in this: in the former, animals act as men in form of animals; in the latter, animals are allowed to act as animals. Benfey ascribes this peculiarity of Indian conception to the belief in Metempsychosis (q.v.), and the exclusively didactic nature of Indian tales. All tales, therefore, in which animals play the part of human beings are Indian. As to the ultimate origin of beast-fables, Benfey's conclusion is that most fables about animals are western or Æsopic; that, on the contrary, the tales are Indian. In all our folk-tales the relations between the heroes and animals are usually kind or helpful. Nothing is more common than for the hero to do some kindness to a suffering animal, who afterwards shows his gratitude by some signal service to his benefactor at the moment of his own perplexity. Beasts and birds often carry grave secrets to favoured individuals, and so save them from unhappiness and

danger. If this feeling for animals is not of Buddhist origin, it is at least, as Cosquin points out, a prevailing Indian idea, and is certainly derived from the belief in metempsychosis, which effaces the distinction between man and the animal, and which in every living thing sees a brother. Benfey throws out the hint that metempsychosis may have come from Egypt. It does not occur in any of the Indo-European races save the Indians themselves, and undoubtedly intimate relations once existed between the Indus and the Nile. The Phœnicians were active intermediaries of commerce, and just as it is very probable they carried writing to India, they may have carried and re-carried many other elements of civilisation. Sir Richard Burton will have none of Benfey's refinement of distinction between the Æsopic and the Hindu apologue, and adds: 'The essence of the beast fable is a reminiscence of *Homo primigenius*, with erected ears and hairy hide, and its expression is to make the brother brute behave, think, and talk like him with the superadded experience of ages. To early man the "lower animals," which are born, live, and die like himself, must have seemed quite human enough and on an equal level to become his substitutes. The savage, when he begins to reflect, would regard the carnivore and the serpent with awe, wonder, and dread; and would soon suspect the same mysterious potency in the brute as in himself: so the Malays still look upon the Uranutan, or Wood-man, as the possessor of superhuman wisdom. The hunter and the herdsman, who had few other companions, would presently explain the peculiar relations of animals to themselves by material metamorphosis, the bodily transformation of man to brute, giving increased powers of working him weal or woe. A more advanced stage would find the step easy to metempsychosis, the beast containing the Ego (*alias* soul) of the human: such instinctive belief explains much in Hindu literature, but it was not wanted at first by the apologue.' There are many apologues in the *Arabian Nights*, but these are much longer and more involved in circumstance than the straightforward fables of Æsop, with their single event and simple moral. But these, despite their monumental antiquity, Burton regards as the offspring of a comparatively civilised age, when a jealous despotism or a powerful oligarchy threw difficulties and dangers in the way of speaking plain truths. He adds: 'A hint may be given, and a friend or foe can be lauded or abused as Belius the sheep, or Isengrin the wolf, when the author is debauched the higher enjoyment of praising them or disparaging them by name. And, as the purposes of fables are twofold, the speaking of brute-beasts would give a piquancy and a pleasantness to moral design as well as to social and political satire.' The danger of attempting openly to administer plain reproof to absolute Asiatic potentates may well have led to the invention of fables in which the lessons intended to be imparted were veiled under ingenious fictions of animals. Mr Clouston quotes the following story from an oriental historian of a tyrannical monarch having been reclaimed by such means. 'A wise and prudent vizir once related the following fable to his royal master: There was an owl in El-Basra and an owl in El-Mosul. And the owl of El-Basra said to the other one day: "Give me thy daughter in marriage to my son." Quoth the owl of El-Mosul, "I consent, on condition that thou give me as her dowry a hundred ruined villages." "That," replied the owl of El-Basra, "I cannot do at present: but if Allah spare the sultan another year, I will do what thou request." The sultan, deeply impressed by this simple fable, at once caused all the ruined towns and villages to be rebuilt, and henceforward studied to promote the

well-being of his subjects, and to render his rule easy and acceptable to them' (Clouston's *Popular Tales and Fictions*, 1887, vol. i., pp. 275-6).

See Benfey's masterly introduction to his translation of the *Panchatantra* (2 vols. Leip. 1859); Tylor's *Primitive Culture* (1871); chap. ix. of Sayce's *Introduction to the Science of Language* (2d. ed. 2 vols. 1883); the late I. G. N. Keith-Falconer's *Fables of Bidpai*, with its learned and suggestive introduction (1885); the introduction to Emmanuel Cosquin's *Contes populaires de Lorraine* (2 vols. 1886); and sect. iii. of the 'Terminal Essay' in vol. x. (1886) of Sir Richard Burton's *Thousand Nights and a Night*.

Beat. In Music, the English name of a grace or ornament, but of various signification, applied by different writers to the acciatura, the mordent, and the reversed shake. From this uncertainty the word is now in disuse. Beat also means a signal given by the hand or foot of the conductor to insure simultaneous performance: the hand or foot being raised on the unaccented, and lowered on the accented part of the bar.

BEATS are a wavy throbbing effect produced by the sounding together of two musical notes not in perfect unison or consonance, and are of practical importance in the art of tuning.

Beatified, in an inferior degree of canonisation introduced in the 12th century, is a solemn act by the Catholic Church by which the pope, after scrutinising the virtues and miracles of a deceased person, pronounces him to be among the blessed. After this he is canonised, but not universally as in canonisation, but in some district or order of the church. Beatification is generally a step towards canonisation (q.v.).

Beating and Wounding. See ASSAULT.

Beating the Bells. See BOUNDS.

Beaton, or BETHUNE, DAVID, Cardinal and Primate of Scotland, was a younger son of John Beaton of Balfour, in Fifeshire. In 1494, he was educated at the universities of St Andrews and Glasgow, and afterwards studied theology and law at Paris. His tact and general abilities recommended him to the Duke of Albany, regent during the minority of James V., who in 1519 appointed him resident for Scotland at the French court. In 1525 he took his seat in the Scots parliament as abbot of Arbroath; his uncle, James Beaton, on being translated three years before from the archbishopric of Glasgow to St Andrews, having resigned to him that abbey, with half the rents. In 1528 Beaton was appointed Lord Privy Seal, and he is said to have been the adviser of James V. in instituting the College of Justice. Court of Session in Scotland, the idea of which was suggested by the constitution of the parliament of Paris. Beaton subsequently was twice sent ambassador to France, to negotiate James's two marriages. During his residence at the French court, he was admitted to all the privileges of a French citizen, and in 1537 was appointed Francis I. Bishop of Mirepoix in Foix. After his return, he became confidant to his uncle in the see of St Andrews, and in 1538 was by Pope Paul III. elevated to the dignity of a cardinal. On his uncle's death in 1539, he succeeded him as Archbishop of St Andrews and Primate of Scotland, and soon commenced a persecution of the reformers, already numerous and increasing. That he might be invested with supreme authority in all matters ecclesiastical, he obtained from the pope the appointment of *legatus a latere* in Scotland, and induced the king to institute a Council of Inquisition, to inquire after heretics in all parts of the kingdom. To maintain the French influence and prevent danger to the Catholic

and from a friendly connection with England, contrived to frustrate a proposed meeting of James with his uncle, Henry VIII., and even prevailed on the former to declare war against England. On James's death, after the disastrous overthrow of the Scots at Solway Moss (1542), Beaton produced a forged will, appointing himself and three others regents of the kingdom during the minority of the infant Queen Mary. The nobility, however, rejected the fictitious document, and elected the Earl of Arran regent, who then professed the reformed faith. Beaton next month was arrested and imprisoned, accused, among other charges, of a design to introduce French troops into Scotland, in order to stop the negotiations then in progress with Henry of England for a marriage between the young Prince of Wales and Queen Mary. He was soon after liberated, and reconciled to the regent, whom he induced to abandon the English interest, and publicly to abjure the reformed religion. On the young queen's coronation in 1543, Beaton was again admitted of the council, and appointed chancellor. During a provincial council of the clergy held at Edinburgh, at which he presided, he caused the celebrated preacher, George Wishart (q.v.), to be apprehended at Ormiston, and conveyed to the castle of St Andrews, where he was burnt at the stake. Beaton and other prelates witnessing his sufferings from a window. A conspiracy having been formed against him, at the head of which were Norman Leslie, Master of Rothes, and Kirkaldy of Grange, Beaton was assassinated in his own castle of St Andrews, 29th May 1546. Though endowed with great talents, Beaton possessed little learning, and the ascription of certain works to him rests on no valid authority. Haughty, cruel, and intolerant, he was also licentious in the extreme. He had six natural children, three sons and three daughters—the latter married into families of distinction. One of his sons turned Protestant. The popular feeling about his death is happily expressed in the well-known contemporary lines in Sir David Lyndesay's

As for our archbishop, I grant
He was verily a good man,
And we can not but love him;
And yet I think the sooth to say,
Although he soon is well away,
The deed was foully done.

Beaton, JAMES, an uncle of the cardinal's, took his M.A. at St Andrews in 1493, and rose rapidly to be Archbishop of Glasgow (1509), and of St Andrews (1522). One of the regents during James V's minority, he upheld the Hamilton against the Douglas faction. To the Edinburgh street-fight between them, famous in history as 'Cleanse the Causeway' (30th April 1520), he came wearing mail beneath his episcopal habit; but when Gawain Douglas, the poet-bishop of Dunkeld, besought him to stay the impending conflict, he swayed on his conscience that he knew nothing thereof. His armour rattling as he struck is breast, called forth the rebuke, 'My lord, your conscience chatters.' The Hamiltons lost the day, and Beaton himself owed his life to Bishop Gawain. In 1526 he had, says Pitcottie, to keep sheep in grumo, whilst the Douglasses plundered his flock; but he was soon reinstated in his see, and acted as a zealous supporter of France, and an opponent of the Reformation. Patrick Hamilton and three other Protestants being burnt during his primacy. He died at St Andrews in 1537. Another JAMES BEATON, nephew of the first, was born in 1517, and in 1552 was consecrated to the archbishopric of Glasgow. He was high in favour with the queen-regent, Mary II., and it was to him that she handed the coronation robe (1557) with the remark

'Please you, my lord, to read a psquill.' On her death in 1560, he withdrew to Paris, and there he dwelt as Scotch ambassador, honoured by all men for his blameless life, till his death on 30th April 1603.

Beattie, JAMES, poet and essayist, was born at Laureneekirk, Kincardineshire, in 1735; studied at Marischal College, Aberdeen (1749-53); was for five years schoolmaster to Fordoun parish; in 1758 was appointed a master of Aberdeen grammar-school, and in 1760 professor of Moral Philosophy in his old college. He had published three or four volumes of verse, when in 1770 appeared his *Essay on Truth*, an onslaught upon Hume, which met with most extravagant success. The author himself naturally shared the popularity of his essay. He was introduced to George III.; dignitaries of the English Church solicited him to take orders, with promise of high preferment; but neglect has long since overtaken his treatise, which indeed is essentially commonplace. In 1771 appeared the first part of *The Minstrel*, and in 1774 the second. It overflows with a sweet poetic emotion, and is rich in picturesque descriptions, while the versification has a quiet fullness of melody. The author's gentle yet fervent spirit beats in every line. The poem describes the progress of a poetical genius born in a rude age, from the first dawning of fancy and reason, till that period at which he may be supposed capable of appearing in the world as a minstrel. Beattie intended to have added a third part, but circumstances hindered him. In 1776 he published a series of essays on *Poetry, Music, &c.*, in 1783 *Dissertations Moral and Critical*, in 1786 *The Evidences of the Christian Religion briefly and plainly stated*, and in 1790-93 *The Elements of Moral Science*; all of which works are written in a clear and elegant style, and with a high appreciation of the good and beautiful. He died August 18, 1803. See his Life by Sir William Forbes (1806), and the Rev. W. R. Fraser's *History of Laureneekirk* (1880).

Beaucaire, a town in the French department of Gard, on the right bank of the Rhone, opposite Tarascon, with which it is connected by a suspension bridge, 14 miles SSW. of Avignon. Vessels enter its harbour by a canal communicating with the Mediterranean. A great fair, established in the 13th century, is held from the 15th till the 20th July. It was once one of the principal occasions of trade between France, Italy, and the East, and was attended by 300,000 strangers. The fair is still the scene of a brisk trade in silks, wines, oil, southern fruits, and leather. Pop. (1881) 8309.

Beauce, (1) a district of France, partly in the departments of Loire-et-Cher and Eure-et-Loire, of which the capital is Chartres. It contains some of the finest corn-land in France, and in early summer shows an almost uninterrupted plain of waving corn. (2) Also a south-eastern county of the province of Quebec, Canada.

Beauchamp, ALPHONSE DE, historian and publicist, born at Monaco in 1767, entered the Sardinian military service, but in 1792, on the outbreak of the war with France, refused to bear arms against the republic, and obtained his discharge. Being, however, suspected of treasonable designs, he was imprisoned for some months. After his liberation, he returned to Paris, where, on the fall of Robespierre, he obtained a situation in the office of the minister of police, and had the surveillance of the press. Here he commenced his *Histoire de la Vendée et des Chouans* (3 vols. Paris, 1806; 4th ed. 1820), for which Fouché supplied the materials. As

this work displeased the emperor, Beauchamp was banished to Rheims, but was recalled in 1811, and again received a subordinate appointment, which he lost in 1814. At the Restoration, he received a small pension, and he died 1st June 1832. Beauchamp's numerous historical works include histories of Brazil, Peru, the campaign of 1814-15, and a life of Louis XVIII.; and to him have also been ascribed the *Mémoires de Fouché*.

Beaulewerk. TOPHAM (1739-80), who figures in Boswell's *Johnson* as the loved and intimate friend of the lexicographer, was the only son of Lord Sydney Beaulewerk and a grandson of the first Duke of St Albans. He had the easy air of a man of the world who had seen much and who could describe what he had seen; his conversation was lively, and his tastes in science and literature wide and eclectic. During his friend's last illness, Johnson said he 'could walk to the extent of the diameter of the earth to save Beaulewerk,' and after his death wrote to Boswell, 'Poor dear Beaulewerk, his wit, his folly, his acuteness and maliciousness, his merriment and reasoning are now over. Such another will not often be found among mankind.' In 1768 he had married Diana, eldest daughter of the second Duke of Marlborough, two days after her divorce from Lord Bollingbroke. An artist of some ability, still known through Bartolozzi's engravings, she was born in 1734, and died in 1808. See G. Birkbeck Hill's *Dr Johnson, his Friends and his Critics* (1878).

Beaufort, an Angevin town of 2500 inhabitants, in the French department of Maine-et-Loire, 19 miles E. of Angers. Its ancient castle came into the hands of the Lancaster (q.v.) family at the end of the 14th century, and gave name to the natural and afterwards legitimated sons of John of Gaunt. The Tudor (q.v.) claim to the throne arose from the marriage of the Earl of Richmond with Margaret, daughter of John Beaufort, Duke of Somerset, whose son ascended the throne as Henry VII. Charles Somerset, natural son of the third Duke of Somerset, was created Earl of Worcester in 1534; the fifth earl was raised in 1642 to the marquise of Worcester, and the third marquise in 1682 to the dukedom of Beaufort.

Beaufort, (1) a town and port, North Carolina, U.S., at the mouth of Newport River, has a good harbour, and some trade in rosin and turpentine. Pop. (1880) 2981. (2) A town and port of South Carolina, on Port Royal Island, and terminus of Port Royal Railroad, 14 miles from the ocean. It

has a good harbour, and is a favourite summer resort. Pop. (1880) 2549.

Beaufort. WEST, a town of Cape Colony, in the foot of the Nieuwveld Mountains, founded 1820, 338 miles NW. of Cape Town, with which it is connected by rail. Pop. (1880) 1600.

Beaufort, HENRY, Cardinal, born in 1377, was a natural son of John of Gaunt, Duke of Lancaster, by Catherine, widow of Sir Hugh Desp'ers, and was thus half-brother to Henry IV. His parents were married in 1396, and their children were legitimated next year by Richard II. He studied at Oxford and at Aix-la-Chapelle, was consecrated Bishop of Lincoln in 1398, and in 1400 succeeded William of Wykeham as the see of Winchester. He three times was chief of chancellor, and was involved in all the most important political movements of his time. At the Council of Constance (1437) he voted for the election of Pope Martin V., to whom in 1426 he was made a cardinal. He strenuously opposed Pius V.'s proposition to levy a tax upon the clergy, in order to raise money for a crusade on the war against France; but eventually he lent the monarch, out of his own private purse, £28,000.

END OF VOL. I.



